

BRITISH ORCHIDS



BY

A. D. WEBSTER



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BRITISH ORCHIDS.

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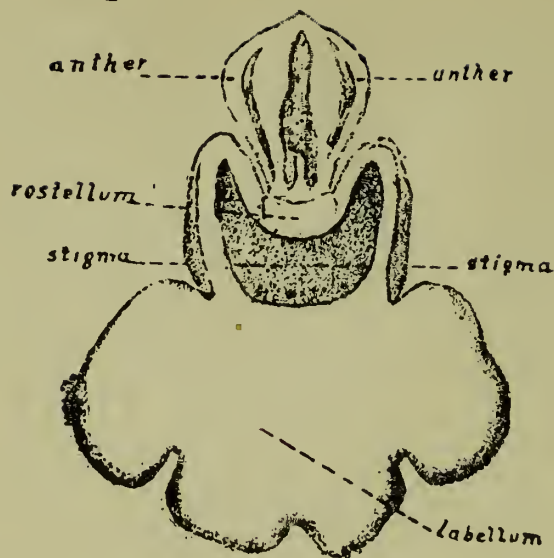


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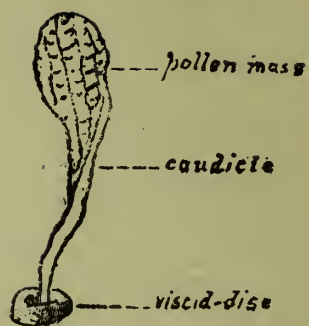


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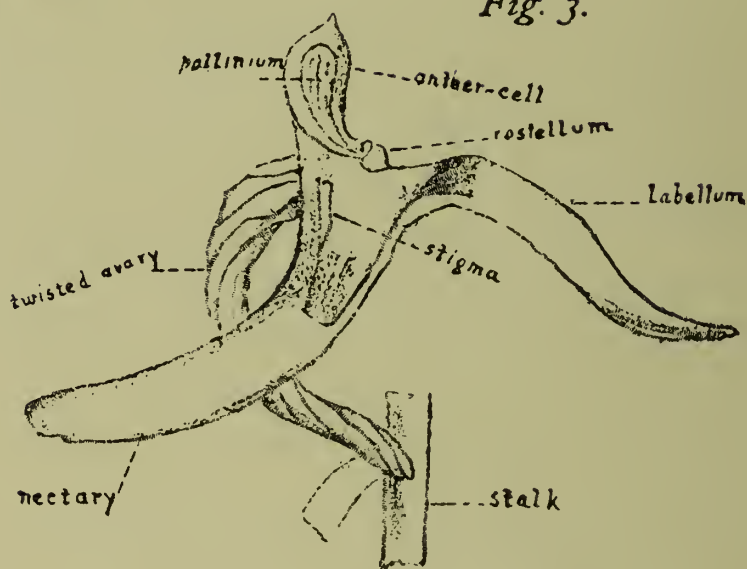


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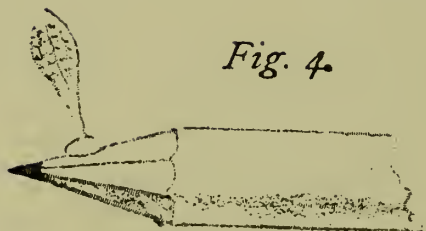


Fig. 5.



Fig. 6.



ORCHIS MASCULA.
(SHEWING METHOD OF FERTILIZATION.)

BRITISH ORCHIDS.

CONTAINING

AN EXHAUSTIVE DESCRIPTION OF EACH
SPECIES AND VARIETY,

TO WHICH ARE ADDED

*CHAPTERS ON STRUCTURE AND OTHER PECULIARITIES,
CULTIVATION, FERTILISATION, CLASSIFICATION,
AND DISTRIBUTION.*

BY

A. D. WEBSTER,

AUTHOR OF "HARDY ORNAMENTAL FLOWERING TREES AND SHRUBS";
"HARDY CONIFEROUS TREES"; "PRACTICAL FORESTRY";
"FLORA OF KENT"; "FLORA OF CARNARVONSHIRE"; ETC., ETC.

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1898

"There with fantastic garlands did she come,
 Of crow-flowers, nettles, daisies, and *long purples*
 That liberal shepherds give a grosser name,
 But our cold maids do *dead men's fingers* call them."
 SHAKESPEARE.

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PREFACE TO FIRST EDITION.

IN preparing the handbook of *British Orchids* the object of the author has been to bring before the reader, in as small compass as possible, a description as well as method of successfully cultivating this beautiful but neglected class of plants. The need of such a work naturally suggests itself on considering the meagre information we at present possess, as well as erroneous ideas generally entertained regarding these plants and their cultivation; and as the description of each plant as well as mode of culture is the result of years of practical experience, observation, and note-making, and has been taken, in the majority of cases at least, from specimens successfully grown by the writer himself, it will be seen that the work has at least some claims to being practical.

My appearance as a public instructor in this particular branch of natural history, is, however, not wholly of my own choice, nor is the object a mercenary one, but being an ardent admirer as well as cultivator of our native Orchids, repeated requests have induced me to record my experience of these plants, hoping it may not only be beneficial to others similarly interested, but a means of awakening fresh interest in this curious and interesting class of plants.

To state that the Island of Java contains over three hundred species of Orchids, and that Great Britain, which is fully two and a quarter times larger, has but forty species and varieties in the catalogue of her flora, may well seem as a confession of poverty, but when we add to this the fact that several of our native Orchids are for various

reasons rendered of particular interest, and one at least has no other European station, the national pride that prompts us to devote a special treatise to the little group will be the more readily understood.

The author gladly avails himself of this opportunity to thank all those who have kindly favoured him with specimens for examination, the Editors of the *Gardeners' Chronicle* and *The Garden* for some of the illustrations, but particularly his friend E. C. Malan, M.A., F.L.S., of Cheam, Surrey, and to whom this work is informally dedicated.

PREFACE TO SECOND EDITION.

REPEATED inquiries after "British Orchids," which I regret has long been out of print and extremely scarce, have caused me to print a second edition of the work. Advantage has thus been afforded to add considerably both in text and plates to the original. Permission to make use of the beautiful and accurate drawings of British orchids from *Sowerby's English Botany* has been kindly granted by Messrs. George Bell & Sons. The alphabetical arrangement now adopted will greatly facilitate reference.

A. D. WEBSTER.

GREENWICH PARK, 1898.

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BRITISH ORCHIDS.

CHAPTER I.

INTRODUCTION.

OF late years, in particular, considerable attention has been devoted to the study and cultivation of our native Orchids. This is not to be wondered at, when we consider the beauty and mimicry of flowers displayed by many of the species, the wonderful contrivances for fertilisation, and the ease with which, as garden plants, the majority may be cultivated. With most persons the name Orchid is only associated with the heat and luxuriant growth of tropical climes, and our few native representatives of this great family are known principally to botanists, and by them understood but very imperfectly. True it is that the majority of our native species have but little claim to distinction, for the modest beauty of their flowers, although exquisite in its way, cannot bear comparison with the gay colours of the epiphytal members of the family, so that the preference shown for these latter is but natural, and scarcely to be wondered at.

The peculiar construction and mimicry of the flowers of our native Orchids, combined with their delicate colouring and rare local distribution, should, however, all serve to render these plants favourites and of particular interest to the cultivator of British plants. When we consider the dependency of these plants (all our native species, with perhaps two exceptions) on insects, that the gay colourings,

peculiar structure, and even odour, offensive though it be in some cases, are not mere adornments but of the greatest use in the fertility of these plants and the perpetuation of its race, we cannot but be struck with both admiration and surprise—indeed, the modest confession of the late Charles Darwin, after twenty years' study, that he doubted if he thoroughly understood the contrivances in any one flower, alone shows us how worthy of the most minute and careful examination this family is.

Before entering into a description of the individual species, it may here be well to give a brief outline of the various parts of an Orchid, which will apply to the British species generally. These are terrestrial herbs with tuberous or fascicled roots, and sheathing radical or sessile cauline leaves. The flowers are solitary, spicate, racemose or paniculate, and each furnished with a bract that springs from the point where the flower stem joins the main stem. Perianth coloured and composed of six irregular segments—three inner divisions (petals) and three outer divisions (sepals). The three outer are similar, and also the two lateral inner, whilst the lower inner segment, which is called the *labellum* or lip, differs considerably, and is usually beautifully or grotesquely shaped, and often spurred at the base. Although usually pendent (this being the case in all our native species, with two exceptions), the labellum is properly speaking the upper petal; but a slight twist in the ovary has turned the flower upside down, thus enabling insects to enter the flower more readily. Darwin, in his delightful book the *Fertilization of Orchids*, tells us that “in most flowers the stamens, or male organs, surround in a ring the one or more female organs, called the pistils. In all common Orchids there is only one well-developed stamen which is confluent with the pistils, and they form together the *column*. Ordinary stamens consist of a filament, or supporting thread (rarely seen in British Orchids), which carries the anther; and within the anther lies the pollen or male vivifying element. The anther is divided

into two cells, which are very distinct in most Orchids, so much so as to appear in some species like two separate anthers. The pollen in all common plants consists of fine granular powder; but in most Orchids the grains cohere in masses, which are often supported by a very curious appendage called the *caudicle*. Orchids properly have three pistils or female organs, united together, the upper and anterior surfaces of two of which form the two stigmas. But the two are often completely confluent, so as to appear as one. The stigma is penetrated in the act of fertilisation by long tubes, emitted by the pollen grains, which carry the contents of the grains down to the ovules or young seeds in the ovarium. The upper stigma is modified into an extraordinary organ called the *rostellum*, which in many Orchids presents no resemblance to a true stigma. When mature, it either includes or is altogether formed of viscid matter."

The ovary or seed vessel is a one-celled three-valved inferior twisted capsule, containing numerous very minute seeds, appearing like fine sawdust, attached to the valves.

The variety of colouring in British Orchids, when their small number is taken into account, is certainly remarkable, ranging as it does through almost every grade from greenish yellow to the deepest of purple.

Take as examples the bright yellow of *Cypripedium Calceolus*, the pale yellowish green of the Butterfly *Habenaria*, the deep port wine of the Marsh *Orchis*, the rosy pink of *Orchis pyramidalis*, the bright, glowing red of *Epipactis rubiginosa*, the metallic hues of the different species of *Ophrys*, and the dull foxy brown of *Neottia Nidus-avis*, the Bird's nest Orchid. Not unfrequently flowers of a pink or purple hue exhibit white varieties and *Orchis mascula*, *O. maculata*, *O. latifolia*, *O. morio*, *O. conopsea*, *O. pyramidalis*, and *Ophrys apifera*, have all on several occasions been found in this garb. A remarkably fine white-flowered specimen of *O. conopsea* was sent to me by Mr. Reamsbottom, from his estate Moorock Park, in Ireland, while I have commonly found *O. maculata* and *Epipactis latifolia* of an almost pure

white growing in company with the normal forms. Again, white-flowered forms of *O. pyramidalis*, *O. mascula*, and *O. morio* have been sent to me from several of the southern English counties, *O. latifolia* from Anglesey, and in all probability they have been found in other districts that have not been recorded. The odours of these plants are, however, not so diversified as the colours, although several are particularly fragrant, and others possess disagreeable odours in a marked degree. The Butterfly *Habenaria* and *Orchis conopsea* are deliciously fragrant, both becoming intensified towards evening, but particularly after a shower of rain, when the rich aromatic odour may be distinctly detected at a considerable distance from where the plants are growing. *O. pyramidalis* is likewise slightly perfumed, but, strange to say, this is not the case in all specimens, while, as its popular name denotes, the Musk *Herminium* has a slight but pleasant musky odour.

In *Spiranthes Romanzoviana*, *S. autumnalis*, *Habenaria albida*, and *Cypripedium Calceolus*, the flowers are likewise sweetly scented, although in the latter plant I have quite failed to detect it in some specimens, while in others, at about a dozen feet distance, it was distinctly perceptible.

CHAPTER II.

CLASSIFICATION.

(Synopsis from, and mainly as arranged in, *Hooker's Manual*.)

BRITISH Orchids have been divided into four tribes, containing sixteen genera, or, in all, about forty species.

Tribe 1.—**Epidendreæ**, containing three genera, *Malaxis*, *Liparis*, and *Corallorhiza*.

Tribe 2.—**Neottieæ**, containing seven genera, *Neottia*, *Listera*, *Goodyera*, *Spiranthes*, *Epipogium*, *Epipactis*, and *Cephalanthera*.

Tribe 3.—**Phrydeæ**, containing five genera, *Orchis*, *Aceras*, *Ophrys*, *Herminium*, and *Habenaria*.

Tribe 4.—**Cypripediæ**, containing the single genus *Cypripedium*.

ETYMOLOGY.

Malaxis.—From a Greek word meaning *soft*, in allusion to the smooth or unctuous leaves.

Liparis.—From a Greek word meaning *fat* or *shining*, in allusion to the shining or unctuous leaves.

Corallorhiza.—From two Greek words meaning *coral* and *root*, on account of the much-branched roots which resemble coral.

Epipactis.—A name given by the Greeks to a sort of Hellebore, and used by Swartz to distinguish a tribe of plants previously called Helleborine.

Cephalanthera.—Greek, so called from the position of the anther.

Listera.—Dedicated to Dr. Martin Lister, a celebrated British Naturalist.

Neottia.—From a Greek word signifying *a bird's nest*, and applied to the present species from the tangled, interwoven appearance of its roots.

Epipogium.—From the Greek, meaning the lip being uppermost.

Spiranthes.—From the Greek, *a coil or curl*, on account of the disposition of the flowers on their spike.

Goodyera.—Dedicated to *John Goodyer* an obscure British Botanist.

Orehis.—The Greek name of the plant.

Habenaria.—From the Latin *Habena*, a rein or strap, in allusion to the shape of the lip or spur of some species.

Aceras.—From two Greek words signifying *without a horn*, in allusion to the absence of the spur from the labellum.

Herminium.—From the Greek, meaning *the foot of a bed post*, from the shape of the tubers.

Ophrys.—From a Greek word signifying *an eye-lash*, to which the fringe of the petals may be compared.

Cypripedium.—From two Greek words signifying *Venus* and *a sock or buskin*, in allusion to the slipper-like form of the labellum.

CHAPTER III.

Genus 1.—ACERAS.

Resembling an *Orchis* very closely in flowers and general habit, but destitute of a spur. The two viscid discs lie close together within the rostellum. There is but one species, *A. anthropophora*.

A. ANTHROPOPHORA. Br. (Man Aceras).—A stout plant from 8 to 12, and sometimes as much as 16 inches in height, with several ovate or oblong leaves near the base of the stem. Flower spike rather long when compared with the plant's height, narrow, cylindrical, and bearing numerous flowers of a dull or pale yellow, tinged more or less with brown. Sepals and petals forming a hood. Lip long and narrow, four-lobed, of a pale yellow like the rest of the flower, and occasionally tipped with brown or dark red. It is destitute of a spur.

THE popular name of man *Aceras*, or as it is usually called man *Orchis*, is certainly well bestowed on this plant, as the fancied resemblance to a hanging man in the flower of this singular Orchid is very apparent, the lateral lobes of the lip representing his arms, and the middle one, which is much longer and two-cleft, his body and legs.

It is a rare plant, being principally confined to pastures and copses in the chalky soils of Kent, Norfolk, and Suffolk, but in much less quantity than a few years ago. Numbers of this Orchid are imported annually by some of our nursery firms, so that it can be readily obtained by any one wishing to attempt its cultivation. Like most other inhabitants of a calcareous soil, this Orchid is by no means easily managed under ordinary cultivation—at least such is my experience, for repeated attempts to grow it in anything like a satisfactory manner have been productive of but little success. The tubers, which very nearly resemble those of *Orchis mascula*,

throw up stout stems, and usually flower well for the first year or two, after which the plant gradually becomes less and less, and finally disappears altogether. By planting the tubers in soil that is mainly composed of chalk, better results have, however, been obtained. At Edge Hall, in Cheshire, the Rev. C. Wolley Dod tells me he has been fairly successful in its cultivation.

The flower spikes vary very considerably in size as well



MAN ACERAS.

(*Aceras anthropophora*.)

as density, some being long, and with the flowers loosely arranged on the stem, while others, which are, however, less abundant, are short in stature with a dense flower spike. In colour they, however, vary but little, although specimens with more or less brown or red edging to the sepals and petals are not uncommon. It flowers in June and July.

CHAPTER IV.

Genus 2.—CEPHALANTHERA.

Habit and general appearance of *Epipactis*, but differing in the flowers being erect, sessile, and usually much larger. The lip has no protuberance at the base of the upper portion as in *Epipactis*.

Included in this genus there are three species.—*C. grandiflora*, *C. ensifolia*, and *C. rubra*.

C. GRANDIFLORA. *Rich.* (White Helleborine).—An ornamental plant from 12 to 24 inches in height with a fibrous rootstock as in *Epipactis latifolia*. Leaves at the base broadly ovate, the uppermost narrower and gradually diminishing to lanceolate bracteas.

Flowers upright or more correctly sub-erect, large and handsome, of a creamy-white colour, and produced in a rather lax raceme. Sepals and petals ovate-oblong. Lip obtuse, shorter than the sepals, and distinctly marked with yellow parallel lines.

A VERY ornamental and distinct Helleborine that in May and June produces a rather loose spike of erect yellowish white flowers. It is a native of woods and thickets, chiefly in chalky districts, and extends throughout England from Cumberland to Somerset and Kent, though usually rare. This genus may at once be distinguished from *Epipactis* by the flowers, which are always erect, whereas those of *Epipactis* are pendent. There are also several minute technical differences, especially in the lip and bracts, the latter being always longer than the flowers, this being the reverse in *Epipactis* generally. I have on several occasions found this plant in company with *Epipactis latifolia*, especially when the latter is growing in a free sandy or stony soil on the limestone formation, but never in quantity. Usually it does not attain to the height of that species, although on several occasions I found specimens over 2 feet in height; but in the same favoured situations many plants

of the *Epipactis* had reached a yard in height, thus showing that of the two plants when placed under similar conditions *Cephalanthera* is the lesser.

At High Elms, the Kentish property of the Right Hon. Sir John Lubbock, Bart., this *Cephalanthera* grows with unwonted vigour on the chalk escarpment, and in one of the woods there I have counted as many as fifty plants to



LARGE CEPHALANTHERA.
(*Cephalanthera grandiflora*.)

the square yard, and beneath a spruce fir of only nine feet in branch spread there were seventy-five plants growing.

The rootstock of the present species is invariably embedded at a much greater depth in the soil than that of the *Epipactis*.

C. ENSIFOLIA. *Rich.* (Narrow *Cephalanthera*).—Stem from 1 to 2 feet in length. Leaves narrow lanceolate, the uppermost tapering to a slender point and resembling those of a reed. Flowers whiter and

narrower than those of *C. grandiflora* and with the sepals more acute. Lip with a distinct yellowish dash on its upper surface and marked with faint white lines.

This may best be described as a very narrow-leaved form of the latter, for in stature and colour of flowers both species are almost identical. There is, however, one permanent distinction—the bracts are always shorter than the flowers, whereas in *C. grandiflora* they are considerably longer.



NARROW-LEAVED CEPHALANTHERA.
(*Cephalanthera ensifolia*.)

Like the latter, this is a very ornamental species, but one that is much less seldom seen either in a wild or cultivated state. In a few English and Scotch counties it is frequently met with, extending southwards from Mull and Perth, but it is, like *C. grandiflora*, local in its distribution and seems to prefer a chalky or limestone district and well-wooded locality.

Planted in a fernery and allowed to roam at will, we have found this pretty plant easy of cultivation, although somewhat fickle as regards soil and situation. The flowers are produced in May and June.

C. RUBRA. *Rich.* (Red *Cephalanthera*).—Root composed of numerous fleshy, creeping fibres. Stem about a foot in height with a few sheathing scales at the base, and higher up several lanceolate, ribbed leaves. Upper



RED CEPHALANTHERA.

(*Cephalanthera rubra*.)

portion of the stem including the ovaries minutely yet distinctly downy or pubescent. Flowers very handsome, erect, sessile, of a uniform rose or pink colour except the lip, which is white edged with red, terminal lobe ovate-lanceolate. Sepals and petals acuminate. Bracts exceeding the ovaries. The whole plant wears a reddish appearance.

This rare plant is, except as regards colour of flowers, almost a counterpart of *C. ensifolia*.

Except in a few stations in Yorkshire, Gloucestershire, and Somerset it is rarely seen in Britain. In the park at High Elms, in Kent, I have met with several specimens of this rare Orchid, but in every instance it seemed to be very locally distributed. In southern and eastern Europe it is not uncommon, seeming to have a wide geographical range, although never found in quantity. It is a native of mountainous, stony woods and copses, usually on limestone, where among detached rock *débris*, and occasionally with only a scant supply of soil, it seems to imitate in manner of growth its near relative of our denuded limestone rocks—*Epipactis ovalis*.

The flowers, which are produced during June and July, are very ornamental, although usually few in number and loosely placed on the stem.

CHAPTER V.

Genus 3.—CORALLORHIZA.

Brown or yellowish saprophytes.* Sepals and petals nearly alike. Lip deflexed with small lobes. Column short, with the anther terminal, and four globular, granular pollen masses attached horizontally.

There is but one species, *C. innata*.

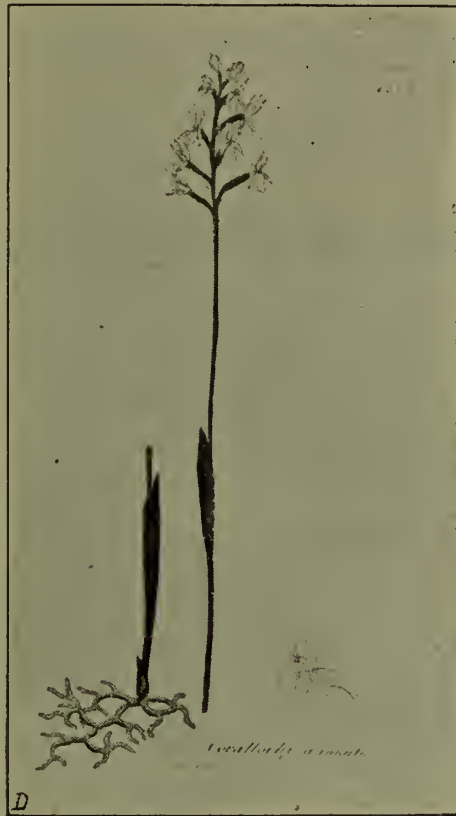
C. INNATA. *Br.* (Spurless Coralroot).—Roots numerous, branched, fleshy, and nearly white. They are also very short and densely interwoven. The whole plant seldom exceeds 8 or 9 inches in length, is leafless, but with the stem bearing a few tubular sheathing scales instead.

Flowers sub-racemose, drooping, of a pale-yellowish colour. Sepals ovate-lanceolate, dark-green, lateral, slightly deflexed. Lip oblong, white, and marked with small reddish or purple lines and spots.

UNLESS in a few Scotch counties, this plant is not known elsewhere in Britain. On the Continent it is widely distributed, and is also recorded from Russia, Asia, and North America. It is an occupant of boggy or sandy woods, usually birch or fir, and has also been found, though in very limited quantity, in sandy seaside situations, notably a few localities in Ayrshire and Forfarshire. In Scotland this plant is, however, more plentiful than is generally supposed, there being several stations, as well as those recorded in our floras, from some of which I have received authentic specimens. On one occasion an unknown friend kindly sent me a square of peat containing the roots of

* Sachs (*Botanical Text Book*) calls the Coralroots, particularly *C. innata*, "saprophytes," because they "make use . . . of the materials of other plants which are already in a state of decomposition."

this plant; but, although I imitated as nearly as possible its native haunts and soil, no plants ever appeared. I am



CORAL ROOT.
(*Corallorhiza innata*.)

not aware that any one has successfully cultivated this rare and curious Orchidaceous plant.

CHAPTER VI.

Genus 4.—CYPRIPEDIUM.

Rootstock fibrous, creeping. Stem leafy. Flowers one or two, with a large inflated lip. Column bearing a dilated, terminal lobe, below which are two short anthers, one on either side. Pollen viscid.

C. CALCEOLUS. (Lady's Slipper).—Rootstock fibrous, creeping horizontally. Stem leafy, a foot or more in height, the leaves oblong, acuminate, and ribbed. The flower, for there is rarely two, terminal, large, and conspicuous, having the sepals and petals of a brownish purple, and the lip, which is large and inflated, of a clear yellow colour and tinged internally with purplish spots. The upper sepal is broadly lanceolate, ribbed, $1\frac{1}{2}$ inches in length, the two lowermost combined. Petals rather longer and narrower than the sepals, and slightly wavy.

THIS, the only species of the genus indigenous to Britain, is now becoming very rare, if not, indeed, quite extinct, in the few Durham and Yorkshire stations from which it has been recorded. On the Continent it is, however, widely distributed, and in some places occurs in great abundance; but the hundreds of plants ruthlessly torn up each season and sent into our English markets must, in the long run, materially lessen the number even in places where the plant is at present found in almost unlimited quantity. The peculiar structure and elegance of this Orchid renders it a very desirable acquisition for the rock garden or flower border.

Externally the labellum, in all the specimens I have flowered, is of an unspotted yellow, but the interior is distinctly marked with three or more reddish-brown dotted lines. The face of the column is, likewise, marked with spots of the same colour, and which, from being visible through the

large opening in the labellum, renders the flower peculiarly distinct and attractive. As this plant is of particular interest and, moreover, the largest flowered and handsomest of our native species, it is well worthy of a little extra care in the way of cultivation, and being very amenable to such should be included in every collection, even the choicest.

The cultivation of this pretty and very desirable garden



LADY'S SLIPPER.
(*Cypripedium Calceolus.*)

plant is simple indeed, and no one, even an amateur in plant cultivation, with a well-rooted specimen to start need despair of success attending his first attempt. The advice to select a *well-rooted* healthy specimen should be particularly attended to, for even with the most skilful management and unfailing attentions afterwards, badly rooted plants, or such as have been allowed to become dry and shrivelled through

improper care, after being lifted will, in most instances, defy the best attempts to succeed in getting them established; indeed, in my own case, I have more than once felt both grieved and disappointed at how badly I have been repaid for the most careful planting, and after management, of not only this, but various other Orchids as well, the roots of which had got damaged either in lifting or in transit. Too often has it been the case that persons who have attempted the culture of these plants have, after a year's trial, given it up in disgust and concluded by branding terrestrial Orchids generally as both wayward and unmanageable. This, in the majority of cases at least, may be attributed to badly-rooted or injured specimens being got to start with, for it should be borne in mind that, perhaps, no other class of plants suffers so much from injury, either to root or stem, as Orchids, and which fact should of itself make cultivators insist on nurserymen supplying to them only such plants as have uninjured roots, or better still, those that have been grown for a couple of years in their grounds. I have seen a consignment of the very *Cypripedium* under notice sent over from the Continent, the individual plants being sold at one shilling each in this country, that I would hardly have paid carriage on, and I might safely add, and be within due bounds in stating, that of the several hundreds included in the consignment, 90 per cent. have succumbed, whether to the ruthless manner in which they were torn from their native haunts or the careless method of packing to which they were subjected before being sent over to this country. Another point, although, perhaps, apart from the subject matter of this book, is this, that plant-importers should be very careful to keep Orchid roots in a partially damp state from the time of their arrival in this country until sent to their customers, for to this as well as careless lifting may be attributed much of the difficulty usually experienced in getting these plants to start away freely and become established.

In planting *Cypripedium Calceolus* I have been most

successful by using a mixture of strong yellow loam, that of a silky, fibrous nature is best, freely mixed with sharp river sand and a few pieces of broken limestone about the size of filberts and smaller. An eastern aspect, although said to be of great importance, has not been found so in my own case, for the portion of my garden in which this beautiful Orchid became perfectly established, in at least three different places, must be described as having a southern or south-western. Where the roots of this *Cypripedium* are to be planted take out the ordinary garden soil for 10 inches or a foot in depth, half fill the hole thus made with the above compost, on it spread an inch thick coating of rough sand freely commingled with well broken-up limestones; place the plant on this, the roots being carefully spread out to their full extent; a little sand, which has a wonderfully beneficial effect in furthering the growth of the rootlets, should now be strewn on and well in amongst the roots, and the remaining portion of the hole filled up with loam, sand, and pieces of limestone. Under such a course of treatment, and by carpeting the surface of the ground with some low-growing plant so as to prevent too speedy evaporation of moisture during dry weather, we have succeeded in establishing this noblest and handsomest of British Orchids. The plant usually appears above ground about the beginning of April, has attained full dimensions early in June, flowers the third week in June, ripens its seed about mid September, and dies off early in November.*

Three hundred years ago (in 1597), this plant was cultivated and figured by Gerard, the illustration being remarkably accurate and minute in detail.

* Extracts from a paper on "The fertilization of *Cypripedium Calceolus*," contributed by A. D. Webster to the *Botanical Society of Edinburgh*, July, 1886.

CHAPTER VII.

Genus 5.—EPIPACTIS.

Rootstock creeping. Stem leafy with purple, brown, or whitish flowers in a raceme. Sepals and petals spreading, the latter shorter than the sepals, but otherwise similar. Lip contracted in the middle, free from the column, concave at the base, with two basal protuberances. There are three recognised species, *E. latifolia*, *E. ovalis*, and *E. palustris*.

E. LATIFOLIA. Sw. (Broad *Epipactis*.)—Stem from 1 to 3 feet in height, slightly pubescent above. Leaves large, broadly ovate, ribbed, and clasping the stem. Upper leaves smaller than those lower down and more lanceolate. Flowers varying in colour from dirty white to dark purple, although greenish purple is the ordinary colour; drooping, and usually, though not always, in a one-sided raceme. Sepals broadly-ovate; petals ovate-lanceolate. Lip entire, acuminate, and usually shorter than petals.

WHEN well grown, this plant is not exceeded in stature by any other native species, specimens from 2 to over 3 feet in height being not uncommon. It is also a strong-growing plant, the stem when fully formed and mature being remarkably stiff and erect, with a plentiful supply of leaves broadly ovate at the base, but gradually becoming smaller and more lanceolate as they ascend. The flowers, which are pendent and racemed, vary very much in colour, specimens from dirty white to dark purple being in some districts not uncommon,—the extreme form being by some botanists recorded as a distinct species under the name of *E. purpurea*,—but from exceptional opportunities of investigation, I doubt this claim; slight variations in the breadth of the leaves and form of the terminal lobe of the perianth lip certainly occur in various specimens of *E. latifolia*, but none of these are either sufficiently distinct or constant in character to warrant the plant

being accorded specific identity. On finding the white-flowered form several years ago, I own I was somewhat puzzled, although at the time I labelled it *E. latifolia alba* ; but since then I have found it on various occasions, but always in company with the normal form, and after a careful examination of several hundred specimens, and taking into account the variability of colour in the flowers of *E. latifolia*, I cannot think otherwise than that it is but a well-marked form



BROAD-LEAVED EPIPACTIS.
(*Epipactis latifolia*.)

differing only in colour of flowers from the normal species. I could in one wood alone show all gradations of colour, from pure white, through the normal green, to the deep pinky purple of the so-called *E. purpurea*. *E. latifolia* is in this country a frequent occupant of woods and the margins of shady fields, and seems by no means particular as to soil, provided it is not peaty or excessively damp.

I have, however, always noticed its preference for a somewhat stiff, stony soil or even gravel; indeed, about the largest and finest specimens I have found were growing in the latter class on a retentive subsoil. It is rare on the chalk formation.

In some of the woods and pastures of Carnarvonshire this plant is very abundant, but I have never noticed it at a greater elevation than about 200 feet. As a garden plant, it is of great interest and of the easiest culture, but requires careful transplanting so as to preserve the roots intact, neglect of which will soon prove fatal to even the strongest specimen.*

E. latifolia alba (white-flowered Helleborine).—This is a very ornamental plant, and grows well under cultivation. The flowers are creamy white, but, unless in the colour of stem, which is an ashy yellow, the plant otherwise resembles *E. latifolia*. Growing on the railway embankment between Bangor and Aber stations in North Wales are many fine clumps of this plant. The soil is gravelly.

E. latifolia purpurea differs in no way from the typical plant, except in the pinky purple of the flowers. I have found it on several occasions growing sparsely along with the species.

E. latifolia variegata.—Of this I have specimens collected both in England and Wales. Usually the plant is of low stature, with the leaves conspicuously marked with creamy yellow bands. It is a very distinct variety, and perfectly constant under cultivation.

E. ovalis. Bab. (Dwarf *Epipactis*).—Rootstock creeping. Stem 4-6 inches high, with usually four leaves, the lower one roundly ovate, 1 inch long by $\frac{3}{4}$ inch broad, those farther up rather longer and narrower. Lower portion of the stem bright purple, as is also the under sides of the lower leaves.

Spike composed of eight or ten flowers in a close subsecund raceme.

* As this Orchid, like *Neottia Nidus-avis* and, perhaps, *Ophrys apifera*, I have now found out, appears and disappears at intervals, caused by the bud or eye increasing beneath ground until of a flowering size, care must be taken not to disturb the place in which it is planted.

Petals and sepals of equal size, 3 lines long by $1\frac{1}{2}$ wide, purplish green without, lighter coloured within and with three faint green lines running down each. Lip same length as sepals and petals, 2 lines wide at distal portion, the basal portion almost globose, fully 1 line in diameter and purplish green, unless two small overlapping corners at the base, which are of a bright reddish brown. The distal or outer portion is pinky purple with a raised triangular-shaped excrescence (tubercled) on its surface and which from its deep reddish brown colour renders the lip conspicuous in a marked degree; reflexed at the sides, and with the extreme lip recurved or bent backwards so as almost to touch the basal portion. Each flower is furnished with a narrow, sharp-pointed bract, and contains a great quantity of sweet nectar.

This is a distinct and pretty species, of unusually dwarf habit, and remarkable for producing its dense spike of attractive flowers in advance of the others—appearing a couple of weeks before *E. palustris*, and at least a month before *E. latifolia*.

In my own garden, where the three plants have been established for years, *E. ovalis* flowers in the middle of July, *E. palustris* at the end of that month, and *E. latifolia* from the middle to the end of August.

Regarding its claims to specific identity, botanists are by no means agreed, some describing it as a form, while others have raised it to a distinct species. It is a rare plant, being only known in a few localities in Britain, and there very sparingly distributed. Years ago it was found in some plenty on particular parts of the Orme's Head, but through the enthusiasm of collectors in that quarter few specimens are now met with. It is an occupant of the most denuded limestone rocks and cliffs, and braves fearlessly the hottest glare of the noonday sun. There, growing only where *Pyrus Aria* could find a footing, it seems quite at home, and almost puzzles one to fancy where the nourishment necessary for the bare existence of life can be obtained. The plant seldom exceeds a few inches in height, with ovate leaves, and a beautiful spike, large in proportion to the plant's size, of variously-coloured flowers, resembling in not a small degree those of *E. palustris*, but darker in colour. Regard-

ing its right to specific distinction, the first and greatest point of difference between these plants is, that the rootstock of *E. ovalis* is shortly creeping, the new buds or eyes being formed one close to the parent stem, and the other at a distance of usually 2 inches; whereas in *E. latifolia* the new plant is *always* formed close to the old stem and *never*, that I have seen, at the termination of a rootlet. It is also



MARSH EPIPACTIS.

(*Epipactis palustris*.)

strange that, if the plant is but a form of *E. latifolia*, in the half-a-dozen British stations from which it has been recorded there exists little or no difference either in the stature or general appearance of the plants. Again, when transferred from the bare, parched rocks on which it is always found to the better soil and more sheltered situation of a garden, the habit is not in the least changed, nor do any of the charac-

teristics of *E. latifolia* become developed, which one would naturally expect if the plant be but a form of that species that has become altered by a combination of soil and general surroundings. As above mentioned, the time of flowering is likewise different; while the organs of fertilisation also differ in a very marked degree from those of *E. latifolia*. I have grown and flowered the plant for a number of years. J. E. Griffith, F.L.S., to whom I am indebted for living specimens of this Orchid, and who has, on various occasions, examined it on the Orme's Head, informs me that there it springs from cracks or crevices of the rock, or from amongst loose, detached, rocky fragments, and where there is hardly a particle of soil; likewise, that two distinct coloured flowers—reddish purple and pinky white—are commonly to be met with on different specimens.

E. PALUSTRIS. Sw. (Marsh *Epipactis*).—Rootstock widely creeping. This is a smaller plant than *E. latifolia*, with a more slender, wiry stem, and narrower unplaited leaves, the lowermost only inclining to ovate, and tapering to a point. Flowers slightly drooping, much larger and handsomer than those of *E. latifolia*, and the bracts shorter than flowers. Sepals and petals ovate and pointed, internally dirty white streaked with pink or purple. Lip crenate, obtuse, white, variegated with crimson or pink.

This handsome plant is a native of wet, marshy ground in various parts of Britain, more especially in the vicinity of chalk or limestone, and within the influence of the sea. Although by no means common, yet in particular spots it is very abundant and increases rapidly. The stem is usually about a foot in height, purplish, and with a few ovate-lanceolate leaves, largest at the base and gradually tapering upwards. The root of this plant, although described by most botanists as similar to *E. latifolia*, is widely different from that species, and forms an unerring guide as to the plant's identity. It elongates each season, the thickened fibre forming at its termination an eye or bud. In a damp low-lying position of the rock garden this plant may be readily enough established, and where it will soon spread about and

produce abundance of its quaintly ornamental flowers. Being in reality a swamp-loving plant, for it is difficult in some situations I know of to procure specimens dry-shod, should impress on the cultivator the necessity of an abundant supply of water at all times, but more particularly during the growing season. Loamy peat with a calcareous infection



LEAFLESS EPIPOGIUM.

(*Epipogium Gmelini.*)

(See next page.)

will suit it well, at least under the above conditions, and carpeted with *Campanula hederacea* and *Linaria alpina* this pretty plant has run wild in my garden, and from year to year increased in quantity, luxuriance, and splendour. Strong, healthy specimens will not unfrequently produce two or three young plants during the same season. It flowers about the end of July.

CHAPTER VIII.

Genus 6.—EPIPOGIUM.

A leafless saprophyte like *Corallorhiza*, but distinguished from that genus by the spurred flower. Ovary not twisted.

There is one species, *E. Gmelini*.

E. GMELINI. Rich. (Leafless Epipogium).—Rootstock not unlike that of *Corallorhiza*, but usually longer and stouter. Flower stem 4 to 8 inches in height, jointed near the base, and with three or four rather large pendulous flowers of a pale yellowish hue. Sepals and petals narrow lanceolate, margins involute. Lip heart-shaped, superior, and distinctly marked with small dots on the surface. Spur short, thick, and projecting underneath the lip.

THIS is one of our rarest native plants, having only been recorded from a few stations.* On the Continent it is, however, widely distributed but very scarce, usually only a few plants occurring in the same locality. It grows amongst rotten leaves and decayed wood, usually in shady situations amongst trees and in thickets. The peculiar colour of the plant, combined with its small stature and leafless formation, renders it, at all times, difficult to recognize. It flowers in August.

* Discovered some years ago at Tedstone Delamere, near Bromyard, in Herefordshire, by Mrs. W. A. Smith, but not, so far as is known, seen since.

CHAPTER IX.

Genus 7.—GOODYERA.

A small-growing plant, with ovate and petioled leaves. Flower-spike slender and somewhat spirally arranged. Lip not enveloping the column, as is the case in *Spiranthes*, with which genus it otherwise nearly agrees.

There is one species, *G. repens*.

G. REPENS. Br. (Creeping *Goodyera*).—Rootstock branched, creeping, with a few short, downy radicles or fibres. Stem 4 to 8 inches in length, rather slender, glandular, pubescent upwards. Leaves evergreen, acute, stalked, and of a deep green, occasionally speckled or marbled. Flower-spike in spiral series, or one-sided as in *Spiranthes autumnalis*, downy, and issuing from the centre of the tuft of leaves. The flowers are small, yellowish, or cream white, and about a dozen on a spike. Bracts longer than the ovary.

IN Britain this plant occurs very sparingly, having only been found in a few Scotch counties, principally in the Highlands and southwards to Edinburgh, and Northern England. It is an occupant of old mossy woods and forests, where amongst peaty earth and decayed Pine pins it creeps about, although never increasing to a great extent. As in *Spiranthes autumnalis*, the flowers of the *Goodyera* are arranged in a one-sided spike, which is tolerably compact near the point, but somewhat loose further down. The leaves are placed on broad footstalks, which are stem-clasping, and usually crowded near the base of the stem.

A mixture of leaf-mould, decayed Pine pins, and sand will suit it well when introduced as a garden plant; but although under such conditions it flowers freely from year to year, it seldom increases to any great extent. In company with its North American relatives, *G. pubescens* and *G. Menziesi*, I have grown and flowered our little native *G. repens* for several years in a very successful manner until their

dread enemy, the slug, at last put an end to their existence. I do not know of any plant, Orchid at least, of which slugs are so fond as these *Goodyeras*, for even the usual remedies to prevent their attacks were of but little avail, the plants, unless specially protected, being eaten up bit by bit and close back to the root. The situation was a shady one, on the northern side of a holly hedge, the compost used being



CREEPING GOODYERA.
(*Goodyera repens*.)

decayed Spruce Fir pins with a small quantity of leaf-mould and sharp river sand. In this soil they seemed to delight, for all the species not only perfected the most beautiful and healthy of foliage, but produced grand spikes of their pretty creamy-white flowers. Although somewhat rare in Britain, this plant has a wide geographical range, being found in moist woods in Northern Europe, Asia, and America. It flowers in July and August.

CHAPTER X.

Genus 8.—HABENARIA.

Foliage and flowers similar to those of an *Orchis*, but the two anther cells instead of, as in *Orchis*, converging at the base, are separated from each other by a wide space of connective membrane.

Three species are included in the genus *Habenaria*.—*H. bifolia*, *H. albida*, and *H. viridis*.

H. BIFOLIA. *Br.* (Butterfly *Habenaria*).—Tubers entire, carrot-shaped, and tapering to a fibrous point. Stem angular or ribbed, from 12 to 15 inches in length, and with two, rarely three, broadly ovate or elliptical leaves at the base. Flowers in a rather loose oblong spike, white or yellowish white, except a greenish tinge on the lip and spur. Lip spear-shaped, cylindrical and entire. Spur twice as long as the ovary.

THIS, the most ornamental plant of the genus, is widely distributed over Britain, occurring in open woods, meadows, and downs, from sea-level up to great elevations. It is found in a great variety of soils—peat, loam, clay, and sandy—but prefers and attains to greatest perfection in rather moist, rich brown clayey loam. Than this simple tenant of our woods and downs, few plants are more delicately beautiful and interesting. The flowers, which, more especially in the evening after a shower of rain, are deliciously fragrant, are produced on stout stems of over a foot in length. Usually the flowers are rather lax; but this is not constant, as specimens with very compact heads are by no means uncommon. A few spikes of this Orchid cut when just expanding and placed in water constitute one of the sweetest and prettiest of posies, which is alike remarkable for its lasting qualities and the delicious fragrance exhaled. For all this, and considering how plentiful the plant is, I am

now never surprised when people, to whom I show a flower of this *Habenaria*, express astonishment at its quaint shape and delicious perfume, and tell me they have never seen it before. This is no doubt true, and may, perhaps, be accounted for by the commonness of white and yellow flowers amongst our weeds and plants, and so the *Habenaria* passes unnoticed; or, it may be that the time it appears in flower



BUTTERFLY HABENARIA.
(*Habenaria bifolia*.)

is rather early in the season for field explorations, unless, indeed, it be by a few "excursionists" or "town's folk," the majority of whom wander aimlessly about with head erect, far more anxious to find out a beech or plane tree, or may be the copestone of some roadside wall or bridge, on which to scribble their names, than to detect any of Nature's floral treasures on the ground at their feet. Little or no variation either in the colour or structure of the flowers of

this species exists, although the name of *H. chlorantha* has, especially by some of the older botanists, been bestowed on large-flowered specimens of *H. bifolia*, and which have the anther cells more broadly diverging at the base. That certain classes of soil alter the general appearance of this Orchid is readily admitted, but in none of these specimens are the differences either sufficiently distinct or constant to warrant the plants being raised to a separate species. This remark, although it may meet with a rebuff, is simply the writer's belief after years of careful attention to the plant in several districts where ample opportunities have been afforded for its study under various circumstances as regards quality of soil, altitude, and situation.

When found growing in strong, heavy, rather damp loam, the plant is always most luxuriant, the leaves and flowers being much larger, and the latter of better substance and colour than when grown in poor, half-starved soils. Let any one who wishes to try the experiment carefully transplant a specimen of the extreme type, or what has been named *H. chlorantha*, into poor, rather dry soil, and in a wonderful short space of time he will arrive at the above conclusions, and that the extreme type is simply the result of soil in every way suitable for the healthy development of the plant. The position of the viscid discs goes for little, as in several districts which I have explored, intermediates passing gradually from the broad to the narrower forms are not uncommon.

Darwin, in his *Fertilization of Orchids*, writes as follows regarding *Habenaria bifolia*, or the lesser Butterfly Orchid : —“ I am aware that this form and the last (*H. chlorantha*) are considered by Mr. Bentham, and by some other botanists, as mere varieties of one another ; for it is said that intermediate gradations in the position of the viscid discs occur. But we shall immediately see that the two forms differ in a large number of other characters, not to mention general aspect, and the stations inhabited, with which we are not here concerned. . . . The viscid discs of the lesser

Butterfly Orchid are oval, and face each other. They stand far closer together than in the last species; so much so, that in the bud, when their surfaces are cellular, they almost touch. . . . The caudicles of the lesser Butterfly Orchid are relatively very much shorter than in the other species; the little pockets of pollen are shorter, whiter, and, in a mature flower, separate much more readily from one another. Lastly, the stigmatic surface is differently shaped, being more plainly tripartite, with two lateral prominences, situated beneath the viscid discs. These prominences contract the mouth of the nectary, making it sub-quadrangular. Hence I cannot doubt that the larger and lesser Butterfly Orchids are distinct species, marked by close external similarity." That these statements are beyond dispute in some specimens of *Habenaria bifolia* I have often proved, but, at the same time, in certain districts, where the Orchid is found under such variable circumstances, as I have before said, intermediate gradations in the position of the viscid discs are by no means uncommon.

During the summer of 1885 I had sent to me from the Island of Anglesey a curious plant of the Butterfly *Habenaria*, widely different from anything I had seen before. The whole plant was much less in size than *H. bifolia* generally, the spur and two lower sepals being much shortened, and the labellum upturned. The tuber, leaves, and stem agreed in every part with those of *H. bifolia*, only they were proportionately less. On examining the pollinia I found them placed relatively much closer than in the normal form, and the viscid discs being black gave to the interior of the flowers a rather striking appearance, and very different to those of *H. bifolia*. That the upturned labellum prevented, to a great extent, insects entering the flowers was apparent from the seedless capsules. I have likewise seen a specimen of this *Habenaria* with six pollinia instead of two, and all perfectly formed.

In this Orchid, as well as several others on which I have experimented, strong growth may be induced by not allow-

ing the seeds to ripen on the plant; indeed, I have frequently noted that in places where this Orchid is cut over when the flowers are on the decline, the specimens are in a marked degree stronger than where left undisturbed.

H. bifolia variegata.—In a little mountain meadow, at a considerable elevation above sea-level, I was fortunate enough, some time ago, to meet with a remarkably distinct form of this Orchid, having beautifully variegated leaves. There were some half-a-dozen specimens, some in flower, and others, younger, without, distributed over the field and at some distance apart, which induces me to believe that the variegation is constant, and may be reproduced in seedlings. I transferred the largest plant to my garden, where it flowered well, and offered quite a rich contrast to the ordinary form. The others were left untouched for further observation and experiment.

Although in *H. bifolia* will be found a most ornamental garden plant, still to cultivate it successfully has puzzled not a few. When transferred to the garden, it should be lifted with a good deep ball of earth, as the long, carrot-shaped tuber strikes downward for several inches, and if in the least injured permanent evils are the result. I have also noticed that the fresh loam that has been introduced with the plant entices numbers of wire-worm, which soon destroy the vitality of the tuber by boring or eating into it beneath the bud.

Under these circumstances, and more especially if the garden soil is not equally good with that introduced, I have found it advisable to carefully divest the root of all soil, and plant in the place intended with a good dash of sand thrown under and around the tuber.

In a young state, or at a non-flowering period of its existence, *Habenaria bifolia* usually has but a single leaf; from this it must not, however, be inferred that when two leaves are produced a flower must follow, although in the majority of instances that have come under my own notice such is the case. In nearly 100 single-leaved plants examined in a

small mountain meadow there was but one specimen to which a flower was attached, whereas in nearly the same number of plants with two leaves about a dozen were destitute of flower spikes. A plant of this Orchid may, likewise, bear a flower during the present season, whereas next year but a single leaf will be produced.

H. ALBIDA. Br. (Small *Habenaria*).—Root composed of several clustered tapering fibres, occasionally uniting into a deeply-divided tuber.



SMALL HABENARIA.
(*Habenaria albida*.)

Stem about half-a-foot in height, with a dense, cylindrical spike of many small, creamy-white flowers. Leaves lanceolate, light green, glaucous beneath, the lower ones broadest, and rounded at the point. Lip three-lobed, the middle one being largest, and of the same length as the concave sepals.

A sweet little plant, but one that has baffled my best attempts to successfully cultivate. It is usually found grow-

ing amongst short grass, on the drier knolls of the mountain meadow or pasture land, and most luxuriant in what may be described as a fine, peaty loam. Well-grown specimens of this Orchid rarely exceed 7 inches in height, the flower spike alone being 2 inches, remarkably dense, and somewhat cylindrical.

The flowers are sweetly scented, very numerous, and thickly placed on the stem. In North Wales, at elevations of 500—700 feet above sea-level, I have found this Orchid in some plenty growing in company with the Adder's Tongue and Moonwort, along the raised banks of streams and rivulets, or occupying the more open portions of old scrub oak woods, and then attaining a state of luxuriance that we have rarely seen equalled on the exposed hill-side. Some of the high-lying rocky pastures in the vale of Nant Francon, but particularly near Llyn Ogwen, abound with this Orchid, and pleasing indeed it is to see a dryish, grassy hillock almost covered with the sweet white flowers of this pretty dwarfish plant. Usually the specimens grow pretty closely together, each one packed in a couple of square inches, and being remarkably uniform in height and colour of flowers, have a very pleasing effect—indeed, I never meet with this sweet little tenant of our mountain fields but a feeling of intrusion comes over me, and I cannot help considering that each specimen is a rarity, even though I find a couple of hundred to the quarter acre. Half-a-dozen plants lifted very carefully with a small sod of turf attached just before the plants expand, and placed in a 6-inch pot, never fail to attract the attention of even the most unobservant, and invariably cause one to feel sorry that so lovely and sweet a gem is not of the easiest culture. It is a real mountain plant, being found abundantly in the Highlands of Scotland, and extending little beyond the Northern parts of England. It is also found in Ireland.

H. VIRIDIS. Br. (Green *Habenaria*).—Tubers palmate. Leaves deep green, ovate or elliptical. Flowers greenish-yellow, arranged in a rather close spike, and about double the size of *H. albida*. Lip linear-

oblong, about twice the length of the sepals, and terminating in two long lobes, with a smaller one between.

From its dull green, inconspicuous appearance, and small size, this Orchid is by no means easily detected, even when growing in quantity, and for this reason may be more plentiful than is generally supposed. The whole plant seldom exceeds 8 inches in height, with greenish-brown



GREEN HABENARIA.
(*Habenaria viridis*.)

flowers, is more stiff and sturdy than *H. albida*, and with larger and broader leaves. Dry, hilly meadows and pasture lands are its favourite haunts, and the soil in which it delights to grow a rather loose free loam. It is local in its distribution, and frequently only occurs in single specimens; but this supposed scarcity is, I believe, as before stated, owing to the general resemblance of the plant in colour to

the grass amongst which it is usually found. In the Island of Anglesey it is pretty abundant, and has also been found, though sparingly, on the Carnarvonshire hills. The geographical distribution of the plant in Britain is somewhat similar to the latter species,—frequent in Scotland and Northern England, but much less so farther south. Neither this plant nor *H. albida* are very amenable to cultivation, which is, I believe, due in a greater measure to our inability to produce the bracing mountain air in which they seem to delight than from any difficulty in procuring either a suitable soil or situation. *Nature*, of July and August, 1882, contained some papers on “The Colours of Flowers,” by Mr. Grant Allen, in which he endeavoured to prove that all flowers were originally yellow, and that highly modified ones, like those of the Orchid family, changed this primitive colour for more decided tints to attract the highest forms of insect life. The finding of flowers with more or less green, such as *Habenaria viridis* and one or two other British species, leads him on to infer that they have begun to degenerate, in other words, they have found that the bright colours did not serve them as well as the original yellow, and are working back through the intermediate green. It flowers from June to August.

CHAPTER XI.

Genus 9.—HERMINIUM.

The want of a spur at once distinguishes this from *Orchis*. Anther cells wide apart, especially so at the base. Flowers small and inconspicuous, emitting a strong honey-like odour.

There is but one species, *H. monorchis*.

H. MONORCHIS. *Br.* (Musk *Herminium*).—Stem 4 to 5 inches in length, with two, rarely three, lanceolate radical leaves placed near the base. Spike dense, composed of small yellowish-green flowers, which, especially in the evening, have a faint perfume of musk. Lip upturned, of the same colour as the petals, but deeply lobed at each side, and hollowed at the base.

Tuber about the size of a good large pea, nearly globular, and produced at the extremity of one of the fibres proceeding from the crown.

IN Britain this plant is rather sparsely distributed, occurring in but a few English counties (chiefly the southern and eastern), and has not, that I have heard of, been recorded from either Scotland or Ireland.

It is usually met with in barren, calcareous pastures, and about old chalk pits. When transferring this plant to the garden, great care is necessary to avoid injuring the young tuber, which, unlike the generality of our native Orchids, being found at some distance from the original plant, is not easily detected. I have grown it very successfully alongside a block of stone and in soil composed of chalk and loam; the increase has also been rapid, usually three new plants appearing each year. Great differences in the general appearance of this Orchid, but more particularly the flowers, are observable, and this I have noted, even in plants the produce of one parent. In some specimens the flowers are arranged in a close com-

pact spike, while in others they are lax in the extreme. Apart from its sparse distribution and peculiarity of structure, this pretty little Orchid has much to recommend it, for the silky green foliage and spikes of sweetly-scented flowers are both conspicuous and attractive, and seldom fail to arrest the notice of even the most unobservant. Planted amongst chalky loam and in a rather elevated pocket of the rock-work,



MUSK HERMINIUM.
(*Herminium monorchis*.)

we have found the musk *Herminium* to do well; indeed, it is very amenable to cultivation, increasing in quantity and floriferousness from year to year. Several years ago a couple of roots of this Orchid, in their original sod of earth, sent to me from Somersetshire, were planted in a somewhat high-lying position alongside a block of limestone and in soil of a rather dry nature, freely interspersed with broken up

lime rubbish. In such a position and mixture they did remarkably well and increased rapidly, some seasons there being as many as half-a-dozen flower spikes of from 5 to $7\frac{1}{2}$ inches long, and bearing, individually, nearly half-a-hundred of their pretty cream-coloured, sweetly-scented flowers. The whole plant withers away early in the season, the seeds, which resemble the finest of Teakwood sawdust, and which are produced in abundance, being fully ripe about mid-September. By carefully lifting a plant about that time the peculiar method of propagation by increase of the root is plainly visible. It flowers in July.

CHAPTER XII.

Genus 10.—LIPARIS.

Approaching very closely to *Malaxis* in general habit. Sepals and petals linear, spreading. Two pairs of pollen masses waxy, attached by their summits, glands evanescent.

One species, *Liparis Loeselii*, is included in the genus.

L. LOESELII. *Rich.* (Two-leaved *Liparis*).—Bulb greenish, enveloped in soft, pale scales, and sending up in July two equal-sized, bright green, elliptic-lanceolate leaves. Stalk issuing from between the leaves to about double their height, and bearing a raceme of small lemon-coloured or yellow flowers. Sepals and petals spreading linear. Lip ovate, longer and broader than the petals, and recurved at the point.

THIS interesting little plant has only been found in a few stations in England, such as spongy bogs in Cambridgeshire, and two or three of the adjoining counties. The flower stem, which is small and rather brittle, rarely exceeds 6 inches in height, with from five to eight yellowish-green flowers in a somewhat straggling raceme. In a young state, the flower-stem always appears as if cut or broken over, but gradually it increases in length until the flowers are perfectly developed. The leaves are bright green and smooth, almost erect, from 2 to 3 inches in length, by about half that in width, and varying in shape from narrow oblong to broadly lanceolate. Each leaf is furnished with a shorter and smaller outer sheath, or bract, which is usually lighter in colour and more fleshy. Although this plant, as stated in dealing with *Malaxis*, has a tendency to be epiphytal, still I have grown it very successfully for a number of years, in a mixture of leaf mould and brick dust; and although the original bulbs have never increased in number, yet each season they are

stronger than the preceding, and throw up finer spikes of flowers—in fact, they became perfectly established in their new abode. The bulbs have a peculiar propensity for rising out of the ground almost to their full length, but this I have always corrected by an application of fine sandy peat or leaf mould.

True it is this rare member of our Orchid family has, like



TWO-LEAVED LIPARIS.

(*Liparis Loeselii.*)

the *Malaxis*, little to recommend it in the way of floral beauty, and consequently has but small claims on those who cultivate for beauty alone; still to the lovers of our rarer native flora, and considering the interest attached to them, these plants will ever be cherished subjects and well worthy of a bold attempt to naturalise in our gardens.

CHAPTER XIII.

Genus 11.—**LISTERA.**

Herbs with two sub-opposite leaves and small green flowers in a slender raceme. Anther two-celled, fixed by its base in a cavity at the top of the column. Pollen masses two, powdery, or the pollen very loosely cohering in the pollen masses.

There are two species, *L. ovata* and *L. cordata*.

L. OVATA. *Br.* (Tway-blade *Listera*).—Root composed of numerous long, slender, cylindrical fibres massed together. Stem from 1 to over 2 feet in height, bearing two large ovate-elliptical ribbed leaves placed almost opposite, and usually at some distance from the ground. Flowers in an elongated raceme, with minute bracts. Sepals deep green, ovate, and acute; petals lighter green. Lip yellowish-green, twice as long as the petals, and divided into two linear lobes.

UNLIKE the generality of our native Orchids, the root of this plant is not formed of bulbs, but of a number of brownish clustered fibres that spread in a somewhat horizontal direction for 3 or 4 inches. The plant is very widely distributed, and in some places is so abundant as to become quite a nuisance. It seems to prefer rather damp woods, meadows, or pasture land, and usually a shady situation—the soil best suited to its perfect development being strong, damp loam. In Wales it is very abundant, more so than any other species; the lawn at Penrhyn Castle being in some places, during the season, perfectly studded with its by no means beautiful flowers. The woodlands on the same estate are also well supplied with specimens, and I have noticed it in meadows and fields up to 750 feet elevation. In Kent and Surrey it is also abundant.

Generally this Orchid does not exceed 12 or 15 inches in

height, although, under favourable circumstances as regards soil and situation, I have often met with it over 2 feet in height, one unusually large specimen measuring $2\frac{1}{4}$ feet. The leaves are broadly ovate, from 3 to 4 inches in length by rather more than half that in width, placed almost opposite on the stem, and usually at a distance of half-a-foot from the ground. From the leaves downwards the stem is usually



TWAY-BLADE LISTERA

(Listera ovata.)

of a pale-green or yellow, with a few sheathing scales at the base; upwards from the leaves the whole plant is of a bright green, unless when growing in very shady situations, when it assumes a paler colour. As a garden plant, it is readily cultivated, but is more interesting as a botanical specimen than for any beauty of foliage or flowers that it possesses.

L. ovata variegata.—A distinct and interesting form, in

which the leaves are constantly banded with yellow. I have found it both in England and Wales.

L. CORDATA. Br. (Heart-leaved *Listera*).—Rootstock like the preceding but always smaller, and usually less tufted. Stem 4 to 8 inches in length, with two opposite, heart-shaped, acute, and slightly cordate leaves.

Flowers few and small, of a green colour, the lip usually tinged with



HEART-LEAVED LISTERA.

(*Listera cordata*.)

brown or dull red; sepals and petals greenish-brown. Lip linear, bifid, with two teeth at the base, and of a greenish-brown or purple colour. Column without any hood-like appendage as in *L. ovata*.

This plant differs considerably from the latter species, not only in size, but shape and colour of flower. It is a native of mountain heaths, usually in boggy ground, where it seldom exceeds 6 inches in height, though more frequently three-fourths that size. The leaves, which are heart-shaped and

slightly cordate at the base, are usually less than an inch in length, but very broad in proportion, and of the same deep green as *L. ovata*. Stem very fragile, angled, and surmounted by a few small brownish-green flowers. This is in reality a mountain plant, occurring in woods and moors, especially under heather, and sparingly distributed in a few such situations in England, Scotland, and Ireland. On the Dublin mountains, at 700 feet, it grows on *dry* heathy knolls, and generally under the shelter of the heather itself—information kindly furnished me by Mr. Burbidge of the Trinity College Botanical Gardens. It occurs in one or two stations along the Pass of Nant Francon, and near Llanrwst, both high-lying situations in Wales. It is readily cultivated.

CHAPTER XIV.

Genus 12.—MALAXIS.

In general stature resembling *Liparis*, but distinguished as a genus from it by the waxy pollen masses which are in two pairs, and suspended from a gland which terminates the column.

There is but one species, *M. paludosa*.

M. PALUDOSA. Sw. (Bog *Malaxis*).—A slender plant rarely more than 4 inches in height, and with three or four glaucous, upright, oval-shaped leaves near the base of the stem.

The leaves are rough or slightly fringed at the extremity. Flower stem angular and smooth, unless at the base, where it is sheathed with white scales, bearing a rather loose, elongated raceme of small greenish-yellow flowers, having the lip and two of the sepals erect, the third sepal being turned downward.

Petals and sepals much reflexed.

THIS, perhaps the smallest and most delicate of our native Orchids, is generally, though not abundantly, distributed throughout Britain. The minute grass-like appearance of the plant, which renders it very difficult of recognition, as well as the treacherous positions in which it delights to grow, may explain the seeming scarcity of individual plants. Its favourite haunts are the edges of mountain lakes and swamps, where growing on trembling sods of bog-moss, or sphagnum, it almost dares one to venture with impunity. In this country it occurs sparingly in several districts, notably in a marsh near Llanberis, and along the borders of Aber Lake, both high-lying mountain situations in Wales. In Southern England it occurs plentifully in certain districts.

I know of an upland bog where, in company with the Sundews, Butterwort, and Cranberry, this insignificant and

unpretentious Orchid finds a home and peeps out here and there from amongst the sphagnum beds with which the treacherous quagmire is carpeted.

This Orchid is a true epiphyte, thus as it were illustrating for us the habits of that large group of epiphytal tropical Orchids which are now so ardently cultivated in our gardens. Although both this species and *Liparis Loeselii* show a



BOG MALAXIS.
(*Malaxis paludosa*.)

tendency to be epiphytal, still they will also grow as terrestrial species, just as do the Cattleyas and Dendrobies of our hothouses, which in Brazil and India are true epiphytes. The rootstock of *Malaxis* produces a small egg-shaped, solid bulb, almost above ground, or rather amongst the herbage where it grows, and with a few small descending rootlets. These tiny pseudo-bulbs resemble in no small degree those of some tropical species of *Dendrobium*.

As before stated, the lip of this Orchid is, unlike most others, directed upwards, which has been brought about by the spiral twisting of the ovarium. The labellum or lip is in all Orchids properly directed upwards, but assumes its usual position on the lower side of the flower by the twisting of the ovarium; but in *Malaxis* the twisting has been carried so far that the flower occupies the position which it would have held if the ovarium had not been at all twisted, and which the ripe ovarium afterwards assumes by a process of gradual untwisting. This is well illustrated in Darwin's *Fertilization of Orchids*.

By transferring the plant to a damp, shady corner of the garden during the growing season, and with a good patch of sphagnum attached, it will perfect the flower, and thus give ample opportunities for investigation, but with me it has never reappeared.

CHAPTER XV.

Genus 13.—NEOTTIA.

Distinguished as a genus from *Listera* by the brown stems with sheathing scales instead of leaves. Pollen masses two, powdery, glands connate.

Included in this genus there is but one species *N. Nidus-avis*.

N. NIDUS-AVIS. *Linn.* (Bird's-nest *Neottia*).—Root composed of a dense mass of thick, cylindrical succulent fibres. Stem robust, over 1 foot in height, destitute of leaves, but clothed instead with several loose, sheathing, pale-brown scales. Spike rather dense, except at the base, and with a few distant flowers of a pale-brown in every part. Sepals and petals incurved. Lip decurved, concave, and cloven at the extremity into two blunt, rounded, widely diverging lobes.

THIS plant is supposed by not a few to be parasitic ; but such is not the case, although the tannin and other matter of beech and oak leaves is certainly conducive to its growth, which may account for its being usually found beneath the shade of these trees. No doubt, the fact of this plant being found beneath the shade of the beech and oak, combined with its pallid hue and general resemblance to the *Orobanche*, has given rise to what has now become too well founded, viz., that the plant is parasitic. But it is not so. The mysterious appearance and disappearance of this plant has also been frequently noted and commented upon, without any satisfactory explanation being given ; but now that the nature of the plant and its peculiar method of propagation is fully understood, any little mystery is soon cleared up. The plant dies after flowering, but is capable of reproducing a new plant from the point of many of its fibres after they have become disengaged or fallen apart from the parent

rootstock ; the extreme point becoming eye or shoot, which increases in size under ground till fully matured, when it pushes up vigorously, flowers, dies down again, and is reproduced in the same extraordinary manner. As the young plants never appear above ground until of a flowering size (which, I believe, requires five years), the appearance and disappearance of the plant is readily accounted for. As



BIRD'S-NEST NEOTTIA.

(*Neottia Nidus-avis.*)

regards soil, the *Neottia* seems to prefer that of a stiff retentive nature, such as loam or clay ; indeed, the soil in which it is generally found is so hard as to render the lifting of a plant uninjured a task that is by no means easily accomplished. The plant is incapable of cultivation, at least such I have found the case, and I am not aware that any one has been successful. By removing a plant with a good

ball of earth attached, we have succeeded in getting it to perfect the flowering stem ; but as regards reproducing its species, all attempts have hitherto proved of no avail. Under favourable circumstances the stem of this Orchid attains a height of from 12 to 15 inches, is thickest and strongest at the base, with a gradual taper upwards. Usually about one-third of the stem is covered with flowers, the whole forming a cylindrical spike, compact above but rather diffuse or irregular at the base, and of the same dull brown as all the other parts of the plant. The stem becomes stiff and pliable as it advances in growth, and continues in a perfect state for a long time after the seeds are shed—not unfrequently until the following spring. The popular name of Bird's-nest Orchid is derived from the appearance of the root, the fibres of which are so crossed and entangled as to resemble, in miniature, a crow's nest. It is found in England, Ireland, and Scotland, and I have come across unusually fine specimens in the woods at Gwydyr ucha, in Wales, and in both Kent and Herts. In this latter situation, the plants were growing beneath the shade of Beech trees and amongst loose slate *débris* and decayed vegetable matter, the roots in most instances being embedded to the depth of about half-a-foot in the soil.

CHAPTER XVI.

Genus 14.—OPHRYS.

Habit and foliage of *Orchis*, but the flowers are destitute of a spur. Lip perpendicular, usually convex, and resembling more or less the body of an insect. Ovary not twisted.

Three species are usually included in this genus—*O. apifera*, *O. araniifera* and *O. muscifera*.

O. APIFERA. *Huds.* (Bee *Ophrys*).—Tubers entire, roundish. Stem about a foot in height, stout, with a few lanceolate green leaves near the base. Flowers few in number, from three to six, placed rather loosely on the stem, large and conspicuous. Sepals ovate; petals small, linear, oblong, and somewhat downy. Lip prominent, convex, with a terminal appendage, and of a dark, velvety-brown variously marked with yellowish lines and spots.

THIS plant is perhaps the most ornamental of the genus, and derives its popular name from the form and hairiness of the lip, which not inaptly resembles a bee. In various parts of England it is abundant, and also extends into Wales and Ireland, but has not been recorded from Scotland. It is a native of mountain meadows, pastures, and even copses, and is usually found growing in a chalky or calcareous soil, though sometimes in the stiffest clay, usually on the limestone formation. It grows very abundantly on the chalk cliffs between St. Margaret's Bay and Dover, as also inwards at Chelsfield and Orpington in the same county, and where found is usually in great numbers. Most of the species of *Ophrys* are difficult to cultivate, and require special care and trouble in planting, being naturally somewhat delicate. By imitating, as nearly as possible, the conditions under which they are found naturally, I have

succeeded in flowering the present species from year to year ; but under such circumstances I have never known it to increase.

Amongst our native Orchids, the present genus is, perhaps, more particularly worthy of note than any other, for the very remarkable manner in which the flowers of the various species imitate, both in shape and colour, the several



BEE OPHRYS.
(*Ophrys apifera*.)

insects whose names they bear. The flower of the present plant, when fully expanded, has certainly a striking resemblance to our common humble bee, and has, in my own garden, when casually looked at, been mistaken for it on more than one occasion.

The following lines aptly describe the wonderful resemblance borne by this flower to a bee :—

“ Perhaps his fragrant load may bind
His limbs ; we’ll set the captive free.
I sought the living bee to find,
And found the picture of a bee.”

This species is, likewise, remarkable as being one of the two amongst British Orchids that is effectually self-fertilised, for the caudicles of the pollinia are so weak that after the anther cells open the pollen masses topple over directly in front of the stigmatic surface, the viscid disc still remaining within the rostellum, and are there made to vibrate by the slightest breath of wind until the stigma is struck.

O. apifera alba (white-flowered Bee *Ophrys*). A pretty and distinct form, in which the flowers are white or yellowish-white. I have found it in some plenty on the chalk cliffs by the lighthouses near Dover, and it has also been sent to me from at least two counties in Southern England. It flowers in June or July, but I have occasionally found specimens fully developed during May.

O. ARANIFERA. *Huds.* (Spider *Ophrys*).—Tubers ovoid. Foliage more glaucous than in *O. apifera*, larger, and not so erect. Sepals inside of a yellowish-green ; petals oblong. Lip convex, without an appendage, of a dull uniform brown and marked with paler spots or parallel lines on the surface. Anther beak not hooked, the reverse of this being the case in *O. apifera*.

Although in size and general appearance greatly resembling *O. apifera*, still, as will be seen from the above description, these two species differ in many remarkable points. From the broad lip which is marked with different shades of brown, the fancied resemblance to a spider is derived. An unerring point of difference between these two species of *Ophrys* is that *O. apifera* blooms in July, whereas the present plant is usually in full flower as early as April or May.

Another spider *Ophrys* that has been raised by some botanists to a distinct species under the name of *O. arachnites*, occurs sparingly in a few English counties, notably Kent and Surrey. It is a more ornamental plant than the latter, with dark-red and blue flowers ; but forms intermediate

between this and *O. aranifera* are also found, which has induced some of our later botanists to rank it as a subspecies.

In Northern Italy, where *O. apifera*, *O. aranifera*, and *O. arachnites* are found tolerably abundant, Mr. Moggridge has pointed out that these three, together with *O. scalopax* (an Italian species), are connected by so many and such



SPIDER OPHRYS.
(*Ophrys aranifera*.)

close intermediate links that all seem but forms of one species.

Linnaeus, who devoted considerable attention to this genus, was also under the belief that they were but forms, and grouped them all together under the name of *Ophrys insectifera*. Although in Britain the external appearances of these three species are somewhat similar, still the main points of

difference are always recognisable. To me, the Continental plant under the name of *O. arachnites*, from living specimens and coloured drawings sent for my inspection, appeared quite distinct from our *O. aranifera*, and certainly warranted the specific distinction with which it was endowed.

The present species is readily enough cultivated by procuring uninjured tubers and planting in a rather dry elevated portion of the rockwork, in soil composed of gravel and fibrous loam, to which a dash of powdered chalk is added; at least, under such conditions I have got it to do well and flower grandly. Lime or chalk is, however, perhaps, unnecessary in the cultivation of this *Ophrys*, as at Monkstown, Dublin, Mr. Greenwood Pim has got it to do well and flower freely from year to year in soil that is entirely destitute of lime. The procuring of good sound roots with which to start should be particularly paid attention to, as such as have been injured in lifting or by transit, or allowed to become dry and frizzled, can never succeed in a satisfactory manner, and too often only bring about disappointment and regret.

O. aranifera fucifera, specimens of which were sent me from Folkestone, by Dr. Masters, during the summer of 1886, is a less ornamental plant than the species, the lip being usually undivided, often with a gland in the notch and the petals somewhat rough.

O. MUSCIFERA. *Huds.* (Fly *Ophrys*).—Stem 9 to 15 inches in length, rather feeble, with usually three leaves near the base, and naked farther up. Leaves spear-shaped or linear-oblong, much narrower than in any of the other species, and of a pale shining green faintly overlaid with a silvery hue. Flowers few, usually only three or four, placed distant on the stem, and having a striking resemblance to some kind of fly. Lip three-lobed, the side ones short and entire, the middle one largest and divided by a deep angular notch into two smaller lobes. The lip is purplish brown and very distinctly marked with a bluish naked spot on the centre.

In Britain this species is probably more abundant than any of the others, especially in many of the eastern and south-eastern counties of England, as well as in various

parts of Wales. It has been found, but very rarely, in mid-Ireland.

Dry meadows and downs in chalky and limestone districts seem its favourite haunts, although it has been found in damp clayey woods, and alongside heathy ditches in a peaty soil.

In the Island of Anglesey, some low-lying pastures



FLY OPHRYS.
(*Ophrys muscifera*.)

threaded by sluggish streams, or dampish bank or mound that had been left where peats for fuel were at one time procured, afford excellent examples of the plant in question; and though in such situations they may not be extra abundant, still they cannot be considered as rare, and grow with a luxuriance that is quite unequalled on the drier, hilly ground.

To cultivate this plant in anything like a satisfactory manner requires the expenditure of greater care than is necessary for almost any other species. Prepare a composition of equal parts loam and fine peat, to which add a small quantity of sand and lime rubbish ; in this place the tubers, and carpet the ground surface with any low-growing, creeping plants such as the *Arenarias* or *Sedums*, these having a wonderful effect in keeping the soil from becoming dust dry during long-continued drought or winds. Like the other native species of *Ophrys* the plant in question usually succeeds best under cultivation when planted alongside a block of limestone, the roots evincing a great inclination to come in contact with such under ground. The position in which it is planted should be somewhat elevated above the general level of the surrounding ground, a mound or hillock, where superabundant moisture speedily runs off, suiting it best.

The period of flowering varies from May to July, much depending on the elevation at which it grows as well as the nature of the soil and surroundings.

CHAPTER XVII.

Genus 15.—ORCHIS.

Sepals and petals nearly equal, arching over the column. Lip turned downwards, spurred on the under side at the base and lobed or crenated. Anther, with two erect cells, on the face of the column, converging together at the base, with an erect process, each cell containing a pollen mass, contracted below into a short stalk, terminating in a gland or viscid disc. Root a fleshy tuber either entire or palmate. Stem leafy, with a terminal spike of flowers.

Included in this genus there are a dozen species—*O. mascula*, *O. maculata*, *O. latifolia*, *O. morio*, *O. pyramidalis*, *O. fusca*, *O. militaris*, *O. ustulata*, *O. laxiflora*, *O. intacta*, *O. hircina*, and *O. conopsea*.

ORCHIS MASCULA. *Linn.* (Early purple *Orchis*).—Tuber entire, oval, and in full-grown specimens about the size of an ordinary filbert. Leaves broad, elliptic-lanceolate, with longitudinal parallel veins, of a smooth, shining green above, paler underneath, and usually spotted. Flowers purplish-crimson, but subject to great variation, the disc of the lip alone being white and spotted, with a downy surface. Lip three-lobed, the middle one cleft, and reflexed on the sides.

ALTHOUGH one of the commonest, this is perhaps the most ornamental of our native Orchids. It is to be found growing in almost every conceivable soil and situation—from dry, arid ground to that saturated with constant, though not stagnant, moisture, and from sea-level up to about 1,000 feet—though, like other species of the *Orchis* tribe, it undoubtedly prefers and attains greatest perfection in certain classes of soils and in moderately sheltered situations. The largest and finest specimens of this Orchid I have seen were growing in good, strong, rather damp loam, with a southern or eastern exposure, but this latter is not of special importance where partial shade is secured. The colouring in the leaves of this Orchid varies very much, three distinct

kinds being generally recognised—(1) perfectly green; (2) thickly marked with small purple spots; (3) heavily blotched with purple. This variation of leaf has been attributed to several causes, notably the presence of lime or potash in the soil, but careful observations and experiments in this way have now almost fully convinced me that such is not the case. The colour of the flower is not in the



EARLY PURPLE ORCHIS.
(*Orchis mascula*.)

least affected by this variation, and is of all shades, from rich, deep purple, to nearly pure white. The flower is remarkably variable as regards odour, being at one time faintly fragrant, while at another it is so offensive as to be unbearable in a room. The root of this Orchid, if examined during the growing season, is found to consist of two oval tubers, one of which is destined to be the successor of the

other. The newly formed tuber may be readily detected by its plump, vigorous appearance and light colour, the one supporting the present plant being wrinkled and withered and of a dull brown or tawny colour. It is usually found embedded in the soil at a depth of from 3 to 4 inches, and, when starting into growth, sends out from the top or bud end a few thick, fleshy fibres, which spread in an almost horizontal direction for about 3 inches.

The tuberous roots of this, as well as several others of our native Orchids, abound in glutinous matter which is perfectly wholesome and very nutritious, making the salep of the Turks. I have frequently met with this Orchid 20 inches in height, and with a flower-spike, when fully expanded, 6 inches in length. This is, however, exceptional, the average size, under ordinary circumstances, seldom exceeding 15 inches. The reproduction of this Orchid is a rather slow process, for, on examining the roots of several hundred specimens, it was rarely that more than one new tuber was present at each, which naturally leads us to believe that it is propagated in greatest quantity from seed. These also require several years to produce flowering plants, the exact number I have, however, not yet been able to determine by actual experiment.

On low rock-work amongst alpine plants, or even in the open border, few spring-flowering bulbs can equal this Orchid when well grown, either for beauty of foliage and flowers or lasting qualities; and coming into flower at a time when most other plants have only started to grow, makes it doubly welcome. The beauty of this, as well as all our native Orchids, is much enhanced by planting in clumps or masses of, say, from a dozen to twenty plants in each, with just sufficient room for the foliage to become perfectly developed, single specimens of any kind giving but a poor idea of what the plants appear when thoroughly established in good, bold masses.

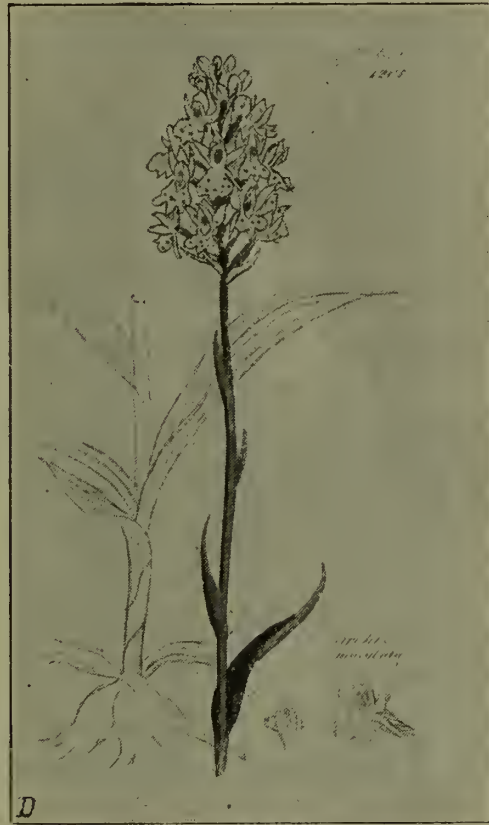
O. mascula alba.—This is a worthy variety, being very handsome and readily cultivated. In the rock garden at

the Rookery, in Kent, this pretty form may be seen flowering freely from year to year. It is of stout growth, with a long and dense spike of pure white flowers, and is perfectly constant under cultivation.

O. MACULATA. *Linn.* (*Spotted Orchis*).—Tubers palmate, spreading and usually rather flat. Leaves lanceolate and marked with dark purple blotches of irregular size, although green-leaved specimens are by no means uncommon. The colour of flowers, though usually pale purple or lilac, is subject to great variation. Spike short, dense, and conical. Lip irregularly three-lobed, and crenate.

The bold, majestic appearance, beauty of both foliage and flowers, and strong, hardy nature, all combine to render this plant one of, if not the finest, of our native species. When well grown in good damp loam this Orchid attains an average height of from 2 to 3 feet, and presents a very different appearance to what it is usually seen in poor, half-starved soils and high-lying situations. The finest and most luxuriant patches of this Orchid I have seen were growing in strong, brown, rather damp loam along the outskirts of a woodland having a northern aspect. The ground was thickly covered with grass, brambles, and bracken, and one of the patches contained considerably over one hundred specimens, the average size of which was from 2 to 3 feet, but one gigantic plant measured exactly 3 feet 3 inches in height, and bore a most magnificent spike of flowers. The leaves of this Orchid are of a pale green above, covered with numerous reddish-brown oval spots or irregularly-shaped blotches, and frequently, though not always, overlaid with a silvery-grey cuticle. Underneath, the leaves are often covered with the same silvery cuticle; but this, I have noticed, is usually wanting when the plant is growing in exposed or high-lying situations, and most noticeable in low-lying, damp ground, and where the plants are shaded from direct sunshine. The lower leaf or leaves are always rounded at the tips, but farther up they become longer and decidedly narrow lanceolate. Green-leaved or unspotted forms are by no means uncommon; indeed, in several dis-

tricts I have noted that the proportion of these to that of the typical plant is as three to seven. This variation in the colour of the leaves of *O. maculata* is by no means easy to account for, and has certainly baffled all my researches to satisfactorily explain. When the reason seems almost conclusive, something crops up to leave us farther from the mark than when we started, and I fear we must say with Bishop



SPOTTED-LEAVED ORCHIS.
(*Orchis maculata*.)

Hall . . . “neither is there any miraculous way but in an ordinary course of nature.” Neither in this Orchid nor *O. mascula* can, in my own opinion, this variation of leaf be attributed to soil, altitude, or situation, as all these I have carefully studied in conjunction with the plants. In the large patch of *O. maculata* referred to above, nearly one-third of the plants were green-leaved, and grew indiscriminately amongst the others, so that in this case at least soil

could hardly be considered as the cause of difference. The production of seed in *O. maculata* is something amazing, one capsule alone, after careful computation, being estimated by Darwin to contain no less than 6,200 seeds, most of which were good; and as there are often over 30 capsules on the same plant, the total number would be 186,000.

As showing the possible rate of increase of this Orchid, and to give an idea what the above figures really mean, we will sum up in the words of Darwin: "An acre of land would hold 174,240 plants, each having a space of 6 inches square, and this would be just sufficient for their growth; so that, making the fair allowance of 400 bad seeds in each capsule, an acre would be thickly clothed by the progeny of a single plant.

"At the same rate of increase, the grandchildren would cover a space slightly exceeding the Island of Anglesey; and the great-grandchildren of a single plant would nearly (in the ratio of 47 to 50) clothe with one uniform green carpet the entire surface of the land throughout the globe."

When we consider, therefore, on the one hand, the great production of seed, and on the other, the comparative scarcity of the plants, we are naturally led to ask the question, What checks the unlimited multiplication of this Orchid?—a question which has as yet never been satisfactorily answered. I have succeeded in raising seedlings of this Orchid, the length of time from the seeds are sown until the plants reach a flowering stage being seven years. Unlike the generality of seeds, those of this and probably other Orchids as well, should not be sown in bare earth, but on a grassy turf and gently washed in amongst the roots of the grass with a fine water-pot or syringe. The experiment of raising seedlings was, in my own case, tried on a patch of *Gentiana verna* and on some of the mossy saxifrages, several fine plants being the reward of seven years' patient waiting, wondering, and watching. As an ornamental garden plant, *O. maculata* is very desirable, and when once thoroughly established, will increase in size

and splendour from year to year. It may be planted in good, rich, rather damp loam, and when once fairly established should be left alone, for, like most of the palmate-tubered Orchids, this plant is rather impatient of root disturbance. The tubers of this, as well as the latter species, are used in the preparation of Salep.

There are several methods of preparing Salep, but the following, taken from the *National Encyclopedia*, is, perhaps, the simplest and best:—"Salep, Salap, or Salop, a nutritious article of diet, much valued in the East for its supposed general stimulant properties, is well suited for children and convalescents. Salep consists of the tubers of several species of Orchideæ, which have been known in medicine from very early times by the name *Orchis*. All these plants have two tubers charged with nutritious matters, and while one is nourishing the flower stems and seeds of the current year, by which it is robbed of its store, the other serves as a reservoir for the flower stem of the succeeding year. This last alone is fit for use. Both are dug up together, but the solid one only is retained. It is dipped in warm water, after which the fine brown skin is easily removed by means of a coarse cloth or brush. The tubers, when thus cleaned and peeled, are arranged on a tin plate and placed within an oven heated to the same degree as is necessary for baking bread; here they remain for seven or ten minutes, in which time they exchange their opaque and milky whiteness for a semi-transparent horn-like appearance, and a yellowish colour, retaining their original bulk. Being withdrawn from the oven, they are exposed during some days to dry and harden in the air; or, by the employment of a very gentle heat, they may be brought to the same state in the course of a few hours. All that is then required to adapt the Salep for food is to boil it in water or milk to the required consistency. Before coffee became so common in Britain, large quantities of Salep were imported from Turkey, Persia, and India. It is still used as a diet drink in some parts of France."

We have prepared excellent Salep, quite equal to that imported, from the tubers of *O. mascula*, *O. maculata*, and *Habenaria bifolia* grown in this country. As a light, though very nutritious and palatable repast, Salep, when well prepared from plump, sound bulbs, particularly those of *O. maculata*, is perhaps excelled by no other article of diet. It should be grated or ground down when wanted for use.

O. maculata superba. This variety of the above was distributed by the late Miss Hope, of Wardie Lodge, Edinburgh, from which circumstance the plant is usually known as Miss Hope's Orchid. It is a very handsome variety, of a strong, sturdy nature, with stiff, almost erect leaves, thickly covered with small purple spots. The history of this plant I do not know, but, if I remember rightly, the Rev. C. Wolly Dod told me that it was found or rather detected in a cottage garden at Kilmarnock, by Miss Hope, and whose name it still bears. I have grown and flowered this plant very successfully from tubers kindly sent me by the late Rev. H. Harpur Crewe, and which, I believe he said were originally given him by Miss Hope. On several occasions I have found plants in the bogs of Carnarvonshire that I consider equally as good as the variety just referred to; indeed, on growing the two plants side by side, I, as well as many others, found it impossible to detect a difference.

The habit and general appearance, as well as situations in which this plant is found growing, go far in establishing what I have on various occasions pointed out, viz., that this variety is far more closely allied to the Marsh Orchis (*O. latifolia*) than to its namesake *O. maculata*. That it is a sport or hybrid between these two plants is admitted by all—on the one hand, closely resembling *O. maculata* in colour of flowers and markings of the leaf, and *O. latifolia* in habit, general appearance, and situations in which it is found growing.

With me Miss Hope's plant never exceeded 12 inches in height, the flower-spike alone being from 4 to 5 inches, very dense, and perfectly cylindrical.

* *O. MACULATA PRÆCOX*. Webster. (Early flowering spotted *Orchis*).—Tubers palmate, smaller and more deeply divided than in *O. maculata*. Stem 4 to 7 inches in height with narrow lanceolate leaves at the base, the upper portion being thickly beset with long linear bracts. Leaves at the base $2\frac{1}{2}$ inches long by 1 inch broad, stem clasping, and usually spotted. Flower-spike large in proportion to the plant's size, 2 to 3 inches in length, usually dense and conical in shape, and varying in colour from a bright pinky-purple to nearly white. Sepals equal in size, also the same length but not so broad as the two inner petals, none of these surpassing the lip in length. Two outer sepals always the same colour and marked like the lip. Two petals and upper sepal forming a hood-like protection to the column. Lip wide in proportion to the flower's size, three-parted, the middle lobe small, angular, and hardly an eighth-part the size of the lip, the whole marked with lines and spots. Spur horizontal with the ovary, the same length or shorter, cylindrical, and pointed at the apex. Bracts linear, acute, and exceeding the flowers in length. Pollinia, after becoming attached to an object, diverge slightly, and afterwards go through the same act of depression as in *O. mascula*.

The above is an accurate description of a sweet little native Orchid that I have frequently found growing in quantity on elevated marshes and mountain meadows, and which is not described in any work on the British Flora. That it should have escaped notice so long is, however, not to be wondered at when we consider the conflicting opinions of botanists regarding the two nearly-allied, though perfectly distinct, species *O. maculata* and *O. latifolia*; and as it is not at all unlikely that the plant in question may be confounded with the former (*O. maculata*), the following wide differences between these two may be pointed out:—(1) The great difference in size. In a small mountain meadow, at 700 feet elevation, on the Snowdon Range of mountains, I examined a large number of these plants and found the average height not to exceed 6 inches, whereas in the same

* This article, under the heading of "An Unnamed British Orchid" (and accompanied by living specimens of the plant), was read before the *Botanical Society of Edinburgh*, on June 10, 1886, but as Professor Dickson considered the plant as a variety of *O. maculata* it is now included as such, although my own convictions, based on the above description, are certainly strongly in favour of its being regarded as a new and distinct species.

county, and on the same estate, *O. maculata* averages 18 inches. As the latter species is, however, rarely found, at least in good form, at such an altitude, and thinking that perhaps the growth of the other might be increased by a lowland station, I, several years ago, so as to test the matter thoroughly, transferred half-a-dozen plants from a mountain meadow, at 700 feet altitude, to the more congenial surroundings of my garden, but although placed under the most favourable circumstances as regards soil and situation, they have, during that period, never attained to a larger size than when lifted in their native wilds. This is certainly the opposite of what we would have expected if the plant is but a form of *O. maculata* that had become dwarfed or stunted by growing in exposed high-lying situations. (2) The difference in time of flowering. The Orchid under notice is usually in flower as early as April or May, whereas *O. maculata*, in our sheltered parks and woods, is not generally in flower till July. Now it is certainly hard to conceive how, if the one is but a variety of the other, an Orchid that flowers in July would, when transferred to the mountain, appear nearly two months earlier. (3) The difference of soil and situation in which they are found growing. *O. maculata* is always a lowland plant, its native haunts being thin, sheltered woods and copses, or fields on the environs thereof, and the soil in which it is most commonly found and in which it attains to greatest perfection a cool, rich loam. I cannot say that in hilly districts I have found the true *O. maculata* at a greater elevation than 200 feet, and then only inhabiting the warmest and most sheltered woodlands. On the other hand the Orchid under notice is of a totally different nature, being in reality a mountain plant that braves fearlessly, at from 500 to over 1,000 feet elevation, the roughest blasts of our bare hill-sides, and which its dwarf, sturdy habit, closely set flower-spike, short, stiff, acuminate foliage, and strong, wiry stem all enable it to do. Damp, boggy meadows amongst sphagnum, and in company with the butter-wort, sundews, and marsh *Pedicularis*, are the favourite abodes of

this small growing Orchid; indeed, so partial is it to damp ground that I have on more than one occasion known—what unfortunately has almost annihilated another of our rarest Orchids in Ireland—whole patches killed outright through the effects of drainage and land improvement. (4) Differences in construction. In *O. maculata* the lower leaf or leaves are always smaller than those further up and rounded at the tips, whereas in the Orchid under consideration the reverse is usually the case. Again, the middle lobe of the lip of *O. maculata* is longer than the side ones, but in the present plant it is invariably shorter.

O. LATIFOLIA. Linn. (Marsh *Orchis*.)—Tubers irregularly and imperfectly palmate, resembling to some extent those of *O. maculata*, though usually smaller and not so much divided. Stem from 9 to 12 or more inches in height, with usually erect leaves of a bright green, which diminish in size from the base upwards. Bracts, especially the lower ones, much longer than the flowers. Spur thick, conical, and shorter than the ovary. Lip three-lobed, and deflexed at the sides.

This is a very handsome and rather variable plant, and, especially as regards identity and classification, has been the subject of more comment than any other native species. By some botanists this plant is considered a variety of *O. maculata*, but that the typical species of each are quite distinct I have long ago been convinced, although at the same time it must be admitted that intermediate forms linking the two plants together do exist, and of which *O. maculata superba*, one of the handsomest, may be cited as an example. The true Marsh Orchid (described as *O. incarnata*, by the older botanists) can, however, never be mistaken for *O. maculata*, as no two native species are more dissimilar, either in size, habit, general appearance, or colour of flowers. The leaves of the typical Marsh Orchid are *never* spotted, like those of *O. maculata*, but of a bright pleasant green, always erect and clasping the stem. There is also this marked difference between the two, that whereas *O. latifolia*, when coming into flower, appears bristly, from the bracts being longer than the flowers, *O. maculata* is

perfectly smooth, the bract and germs being of equal length. The flowers are also cylindrical, and of a flesh or port-wine colour, whereas in *O. maculata* they are conical and pale purple or lilac; in *O. maculata* the lower leaf or leaves are rounded at the tips, and shorter than those further up the stem; but in *O. latifolia* the reverse of this is the case, the lower leaves being usually longest and pointed.



MARSH ORCHIS.

(*Orchis latifolia*.)

A simple and practical solution of this vexed question of nomenclature, and one that would at once render recognition easy would be as follows:—That the name *latifolia* be only applied to the plant having unspotted leaves and consequently deep purple or port-wine flowers and that all specimens with spotted leaves and variously coloured (usually lighter) flowers be regarded as mere hybrid forms between

this plant and *O. maculata*. It is well-known to those who have studied the Marsh *Orchis* that the botanical name *latifolia* (broad leaved) is well bestowed, for when size is taken into consideration the leaves of this plant (the unspotted form) are broader than those of any other of the dozen species included in the genus. Again, the flowers of this plain or unspotted-leaved form are always uniform, or nearly so, in colour—flesh or port-wine, rarely pure white—but they are never mottled and varying in shade, as is always the case in those with spotted leaves. The plain-leaved plant is, likewise in truth *the* Marsh *Orchis*, for it *always* affects the dampest ground in company with the *Iris*, rushes, sphagnum, and other semi-aquatic herbage, whereas the spotted-leaved form usually chooses the higher and drier knolls of similar situations. Of the intermediate forms between these plants, I have particularly noted the following:—1. That in which the habit of the plant remains unchanged, but the leaves are faintly spotted, and the flower of a paler and less desirable hue than the species. 2. *O. maculata superba*, which is usually more robust than the typical *O. latifolia*, and, although the general habit remains to a great extent unchanged, the leaves are distinctly marked with small purple spots, and the flower-spike larger, but wanting in the deep, rich colour that is so characteristic a feature of the normal form. 3. Larger than the latter with the leaves spotted or blotched, and only sub-erect, but far more so than in *O. maculata*, and, like that species, with a pyramidal head of purplish flowers rather loosely placed on the stem. This is the *O. latifolia* of Linnæus. These three forms occur sparingly, along with *O. latifolia*, in wet, marshy ground, growing amongst rushes and other semi-aquatic herbage, but rarely, that I have seen, at a great elevation. In some of the Carnarvonshire and Anglesey bogs and swamps I have frequently met with this plant, sometimes in quantity, so that ample opportunities have been offered for studying them under different circumstances as regards soil and situation.

As a garden plant, *O. latifolia* is rather difficult to manage, for destruction or injury to the least rootlet may be relied upon as destruction to the plant, as well—at least such is my experience. It is, however, a lovely plant, with a peculiar fresh-green tint of foliage that is wanting in any other species. The flower is also beautiful in the extreme, and cannot but induce any one who has seen it in its native haunts to cultivate the plant. There is a white-flowered variety of the Marsh Orchis—*O. latifolia alba*, two remarkably fine specimens of which were sent to me by Mr. J. E. Griffith, from marshes in Anglesey. In general appearance—stature, deep green, unspotted leaves, and dense spike of flowers—these plants could not be detected from the species unless by the flowers, which, instead of the usual deep purplish-pink, were of an unspotted white.

O. PYRAMIDALIS. Linn. (*Pyramidal Orchis*).—Tubers oval or globose. Leaves of a bright, unspotted green, lanceolate, narrow, and acute. Flower-spike short, very dense, pyramidal, and of a rich rose or crimson colour. Spur slender and longer than the ovary. Lip divided into three equal-sized lobes.

Too much can hardly be said in favour of this plant, as for ease of culture, beauty of flowers, and lasting qualities of these when in a cut state, it is perhaps unsurpassed by any other. The flowers cut when just expanding and placed in water with a few pieces of charcoal, will create a feeling of both delight and surprise, as well by their rich crimson colour as by their lasting properties, frequently remaining good in a cut state for more than a fortnight.

It is usually, though not always, confined to limestone districts, and seems partial to a fine red loamy soil such as is usually met with on dry banks or pastures. The whole plant seldom exceeds a foot in height, and has a peculiar silky or glossy appearance which is most noticeable when the flowers are becoming developed. Occasionally the flowers are scented, but, strange to say, this is not the case in all specimens.

This is a very desirable garden plant, and may be

easily grown more readily, indeed, than almost any other Orchid with which I am acquainted, in any open situation by simply adding a quantity of lime or chalk to the soil. Calcareous soil is, however, by no means necessary, as I have grown this Orchid very successfully in pure red loam, similar to that in which it is sometimes found naturally.

Under cultivation it increases rapidly, and being a plant



PYRAMIDAL ORCHIS.

(*Orchis pyramidalis*.)

of great beauty is certainly well worthy of a place even in restricted collections. It flowers in June and July the period being greatly extended according to soil, altitude and situation. In England this handsome Orchid is plentifully distributed, less so in Ireland, and only occurs in a few of the southern Scottish counties. I know of no more beautiful sight in the floral line than to see a gently undulating grassy

hill side decked and garnished with the rich rose-coloured flowers of the Orchid in question, and interspersed at irregular intervals with patches of the deep-blue flowers of the Devil's bit (*Scabiosa succisa*). White-flowered forms—*O. pyramidalis alba*—of this Orchid have occasionally been found, and I recollect picking up fine specimens on the chalky cliffs at St. Margaret's Bay, near Dover.

O. MORIO. Linn. (Green-winged *Orchis*).—Tubers round or globose, and seldom so large as those of *O. mascula*. Leaves lanceolate, almost radical, and with a slight silvery hue overlying the otherwise dull green. Flowers in a loose spike, usually purple, although forms with crimson, violet, and white flowers are not uncommon. Upper petals distinctly marked with green veins, which is a decided characteristic of the plant. Lip three-lobed, crenate, longer than the sepals, pale with purplish spots. Spur obtuse, ascending, and shorter than ovary.

This Orchid, an occupant of rich meadow-land, is readily distinguished from any other by the green veins which mark the upper petals, and from which the popular name of green-winged *Orchis* is derived. It is, however, not unfrequently confounded with the green-leaved form of *O. mascula*, more especially when in a young state; indeed when the plants are destitute of flowers, the differences are by no means easy of distinction, even to those who are perfectly familiar with both species. On a close examination, the leaves of *O. morio* are found to be narrower and more acute than those of *O. mascula*, and with a slight silvery hue; but this latter is most noticeable in young plants, and less so when advanced in growth. To me the plants of *O. morio*, when compared with *mascula*, always appear, if I may use the term, somewhat dull, as if grown in a field adjoining a dusty road or path; but this is always most apparent in full-grown specimens. It is a rather diminutive plant, rarely exceeding a foot in height, but more generally three-fourths that size, and with from six to ten pretty purple and white flowers very loosely placed upon the stem. It is one of our earliest species to start into growth, the foliage frequently appearing above ground during winter,

although the flowers do not expand till about the beginning of summer. This plant is readily cultivated, but should be planted on a rather dry eminence amongst good loamy soil. There are several very distinct forms of this plant as distinguished by the colour of flowers; one of these being white, *O. morio alba*; another pink, *O. morio rubra*; and another deep violet, *O. morio violacea*. In all these varieties the



GREEN-WINGED ORCHIS.

(Orchis morio.)

upper petals are distinctly marked with green lines. The popular names of this Orchid, which are many and rather perplexing, have at various times formed the subject of comment. There can, however, be but little doubt that Shakespeare alludes to *O. mascula*, and not to *O. morio*, as one of the flowers which helped to compose the garland of Ophelia:—

“There with fantastic garlands did she come,
Of crow-flowers, nettles, daisies, and *long purples*
That liberal shepherds give a grosser name,
But our cold maids do *dead men’s fingers* call them.”

The commonly-accepted name of *O. morio*, the buffoon *Orchis*, is in my opinion misapplied, the Greek word *μόρον*, a mulberry, being equally as applicable as *μωρόε*, a fool, and there is certainly some sense in calling it the mulberry-coloured *Orchis*. In Gerard’s *Herbal* (p. 208), where a whole chapter is devoted to this Orchid, the flowers are described as being “in shape like a fool’s hood or cock’s combe, wide open or gaping before, and as it were crested above with certaine eaves standing up by every side, and a small taile or spur hanging downe.” This description is, however, rather “far-fetched,” and might in the same way be applied to most species of *Orchis*.

O. morio is, in company with *O. mascula*, called king’s fingers, as will be seen on referring to Miss Baker’s *Northamptonshire Words and Phrases*.

In some of the southern English counties, particularly Kent and Surrey, this Orchid is very abundant; but not so in Wales, at least the northern parts, although I have occasionally come across specimens, but never in quantity, in the meadows and downs of Carnarvonshire; and it is, likewise, a strange fact that more than once I have found single specimens in situations where, it may be safely said, miles divided them from others of the same kind. It decreases in quantity as we approach north, until in Scotland it is, I believe, entirely wanting.

O. CONOPSEA. Linn. (Fragrant *Orchis*).—Tubers palmate as in *O. maculata*, but usually smaller in size. Stem 12 to 20 inches in length, with narrow lanceolate, unspotted leaves. Flowers mauve-coloured, but subject to variation, very fragrant, and arranged in an oblong or cylindrical spike. Lip divided into three entire, equal-sized lobes. Spur cylindrical, very slender, and about double the length of the ovary.

The beautiful mauve-coloured and deliciously scented

flowers, as well as long slender spur, of this Orchid are strikingly remarkable, and at once render identity an easy task. It is usually found in upland heaths and pastures, growing in rather dry loamy soil, but is strangely uncertain as regards choice of soil and situation; for it is occasionally found in damp marshy ground or morasses where one can hardly tread, and there attaining a size and luxuriance rarely



FRAGRANT ORCHIS.
(*Orchis conopsea*.)

equalled on the drier hillsides. I have also frequently met with this Orchid in mountain meadows or pasture land, growing on the raised mounds of soil that had been thrown up when surface-draining the land; but always refined wherever it grows. Where found it is usually pretty abundant, but local in its distribution, and seems to prefer a calcareous soil. The whole plant is from 12 to 18 and some-

times as much as 24 inches in length ; but the latter height is rather unusual, and only attained under very favourable circumstances. As a garden plant, it is very desirable, and may be easily grown in a mixture of loam and lime rubbish ; but the latter is not really necessary for the successful cultivation of this somewhat variable plant, as by far the finest specimens I have seen were sent me from a damp, heathy shooting ground in the north of Ireland. It increases under cultivation. In Britain *O. conopsea* is pretty abundant, more especially Scotland, where in Dumbartonshire it grows in great quantities. In some of the heathy meadows along the banks of the Earn River, in Perthshire, I have noticed this Orchid growing in its wildest luxuriance, hundreds of specimens occurring in a few square yards, many of the individual plants measuring 2 feet in height, with dense spikes of highly attractive and deliciously fragrant flowers. In Southern England it is pretty abundant. There is a white-flowered form, *O. conopsea alba*, but it is extremely rare, a remarkably fine specimen of which was sent me by Mr. Reamsbottom, from his estate in Ireland. The whole plant measured 21 inches in length, with shining green, lanceolate leaves, and had a most magnificent spike of paper-white flowers. The flower-spike alone was 6 inches in length, remarkably compact, and deliciously fragrant. Half-a-dozen such flowers as this would certainly grace a spare corner in any alpine garden.

O. MILITARIS. Linn. (*Military Orchis*).—Tubers entire, resembling those of *O. mascula*. Leaves ovate or oblong, and more acute than in the nearly allied *O. fusca*, and the flower destitute of the dark ribs or markings that are so characteristic of that species. Lip of a pale purplish-white, three-parted and narrow, the middle one two-lobed and blunt with a point between. Spur short, straight, and hardly half the length of the ovary.

This is a very showy plant, with a rather dense, oblong spike of reddish-grey flowers, marked with darker stripes and spots. It is a rare British species, being confined to a few of the southern English counties bordering on the

Thames, and there chiefly in limestone or chalky districts. When fully developed in favourable situations, this handsome plant often reaches nearly 2 feet in height, with broad acute leaves from 4 to 5 inches in length. It is readily cultivated, but, as well as all those species confined to chalky downs or limestone districts, require a little care in planting, otherwise success cannot be relied upon.



MILITARY ORCHIS.
(*Orchis militaris*.)

In planting place the tubers between pieces of limestone, and fill up with soil composed of loam and chalk. It flowers in May and June, much depending on the season whether late or early. *O. militaris tephrosanthos* (the monkey *Orchis*) is a very curious and ornamental variety in which the lip is crimson and the segments of the mid-lobe very narrow, but these are subject to great variation. Half-a-dozen specimens

of this variety when in full flower have a quaint and very remarkable appearance from the fancied resemblance to the human figure, the lateral lobes of the lip representing the arms, and the middle one, which is much longer and two-cleft, the body and legs. When casually examined, the flower always puts me in mind of that of the continental species



MONKEY ORCHIS.

(*Orchis militaris tephrosanthos*.)

O. undulatifolia. For many years I cultivated this curious and handsome form with perfect success.

O. FUSCA. *Jacq.* (Brown-winged *Orchis*).—Tubers oval, leaves broadly lance-shaped, of a pale shining green, 6 to 8 inches in length by fully $1\frac{1}{2}$ inches in width, the lower ones usually resting on the ground. Flowers in size and structure somewhat resembling the latter species. Sepals dark brown and converging, forming a helmet-like hood to the flowers. Lip broader than in *O. militaris*, three-lobed, with the middle one notched in a rather irregular manner. Side lobes long and narrow

Like the last species, this is a rare and beautiful plant, and one that is well worthy of a place in any garden, even in the most restricted and choice collection of alpinists, and with which it associates admirably.

The flowers form a compact, elongated head of nearly 4 inches in length, surmounted on a stem fully a foot in height. They are of a dark purplish-red colour, very con-



BROWN-MAN ORCHIS.
(*Orchis fusca*.)

spicuous, and continue in perfection for nearly a month. In this country, *O. fusca* is chiefly confined to the chalky woods and downs of Kent, but it is now, like many other native Orchids, becoming fast extinct in the few places where it was known to exist. Less than a quarter of a century ago this pretty Orchid, in all shades from dull white to a very deep mulberry colour, was abundant on

some of the eastern sloping forest grounds of Kent, but to-day, unless in a few well guarded spots, it is rarely seen. The only place I have seen it growing wild was near Halstead, in Kent, where it was discovered and pointed out to me by Miss Flora Latter, of Goddendene, Farnborough. Some of the specimens were tall, stout, and with dense heads of the beautiful showy flowers. They were growing in chalky soil, on the outskirts of a wood.

Although occasionally offered in choice nursery lists, it is very difficult to obtain a true specimen of *O. fusca*, those sold by dealers generally turning out to be inferior continental forms. I have cultivated the true *O. fusca* very successfully by using fine red loam, and placing a handful of rough grit or sand round the tubers at time of planting. It should have a rather elevated position, such as on low rock-work, a damp situation or stagnant moisture being inimical to its growth.

O. USTULATA. *Linn.* (Dwarf or scorched *Orchis*).—Tubers oval and entire. Stem seldom 6 inches in length, more usually 4 or 5 inches, angular, and surmounted with a dense head of from thirty to fifty flowers. Flowers of a dark purple, which when expanding give to the plant a somewhat scorched or withered appearance. Lip with three divisions, the two outer spear-shaped and notched, the middle one longest with two short lobes and an intermediate point. Spur deflexed, blunt, and very short.

In this plant may be readily detected a miniature copy of *O. fusca*. The leaves are few, usually five or six, spear-shaped, and of a pleasant green colour. It is a native of dry, hilly pastures and fields, and is very abundant in some parts of England, but wanting in Scotland and Ireland. On some of the green sloping Kentish hills this little Orchid is very abundant, and during summer quite enlivens the landscape with its quaintly conspicuous flowers.

Between the lighthouses and the sea at St. Margaret's Bay, where the chalk cliffs rise almost perpendicularly from sea-level to six hundred feet, I found a colony of this Orchid, several specimens of which flowered freely in my

garden for many successive years. It flowers in May and June.

O. HIRCINA. *Scop.* (*Lizard Orchis*).—Tubers globose and somewhat downy. Stem from 18 inches to over 2 feet in height, hollow, and with a few rather large lanceolate or elliptical leaves. Flowers of a dirty greenish white, purplish within, and strongly though not pleasantly scented. Lip divided into three segments, the middle one brownish purple, long, linear, and twisted.



SCORCHED ORCHIS.

(*Orchis ustulata.*)

This rare and singular plant cannot be confounded with any other, the long linear lip having a fancied resemblance to a lizard, and from which the popular name of Lizard Orchid is derived. It was formerly found in Kent and Surrey, growing on chalky wastes and meadows, but if not now extinct in a wild state, is certainly very rarely seen. In the *Transactions of the Botanical Society of Edinburgh* (vol. 6,

part 3), Mr. G. Chichester Oxenden writes as follows regarding this plant: "Near the place from which I write (Broome Park, near Canterbury) grows the monarch of Orchids, *Orchis hircina*, the lizard Orchid; and within fifty yards of my house I have one growing which at this moment (25th June, 1860) is $29\frac{1}{2}$ inches high, and with nearly fifty 'lizards' upon it." Some few years ago this Orchid was reported to



LIZARD ORCHIS.

(*Orchis hircina*.)

have been found on the Great Orme's Head by a plant-dealer, who at that time resided at Llandudno; but the statement, which occasioned a good deal of comment at the time, is generally disbelieved by local and other botanists who have paid no small amount of attention to the interesting and rather rare flora of that beautiful headland. Admit we must that the plant-dealer in question had several specimens of this Orchid in his possession at the

time, which, coupled with the fact that the limestone formation of the Orme's Head would be suitable for the growth of the plant, renders the statement not impossible, although certainly very improbable. The above statement likewise acquires a certain semblance of truth from what Professor F. Darwin told me regarding the sudden appearance of a flowering specimen of this Orchid in the Cambridge Botanic Gardens, and where, so far as was known, it had never been noticed before. It is quite possible that, like several other native species, the Orchid in question may suddenly appear in a certain district where it had not been seen for years, and as suddenly again disappear. This plant is difficult to cultivate, and usually dies out after flowering. It may, however, be grown for a year or two by mixing a quantity of fine loam and lime rubbish together, and planting the tuber rather deep, so as to prevent as much as possible the leaves appearing above ground during winter—a fault to which I have found it particularly susceptible.

As a garden plant, it is certainly more interesting as a botanical specimen, or for its curious formation, than for any beauty of either foliage or flowers. I have cultivated and flowered it very successfully from specimens sent to me by Mr. Elwes, of Cirencester, and others.

O. LAXIFLORA. Linn. (*Loose Orchis*).—Tubers globose. Stem from 12 to 18 inches in height, grooved, with long, narrow acuminate, bright green leaves. Flowers resembling those of *O. mascula*, but much larger, of a rich reddish purple, and placed very loosely or distant on the stem. Sepals and petals obtuse. Lip spotted, as broad as long, margins recurved, and with the lateral lobes large and crenulate.

Hitherto this Orchid has, in Britain, only been found in Lancashire, and the Islands of Guernsey and Jersey, there, no doubt, introduced by some means from the mainland of France, where, as well as throughout southern Europe generally, it is pretty abundant. It is an occupant of moist meadow land, and is usually found growing in rather warm maritime districts. When hastily examined, this Orchid has a great resemblance to the green-leaved

form of *O. mascula*, but on closer scrutiny very marked differences are observable. The plant when well grown is taller than *O. mascula* generally, more slender, and with narrower, unspotted leaves. The flowers are also of a richer colour, indeed in some specimens they are almost of a deep red, and placed distant and somewhat irregularly on the stem. From May to June may be considered the flower-



LOOSE-FLOWERED ORCHIS.
(*Orchis laxiflora*.)

ing period of *O. laxiflora*, much depending on the situation in which it grows. On the ballast heaps near Hartlepool, where, as well as on the islands above mentioned, it has recently been found in some quantity, the flowers are produced later than where grown in the damp, sheltered meadows nearer sea-level. No plant is more easily cultivated than the above, for, with good sound tubers to start, and by

planting in rather damp loamy soil, it will soon become established and throw up year by year finer spikes of flowers. With me the increase is slow ; single tubers planted six years having but three stems.

O. INTACTA. *Link.* (Dense-spiked *Orchis*).—Tubers ovoid, entire. Stem seldom exceeding 6 inches in height, but more commonly three-fourths that size, with a dense spike of a small pink or purplish flowers.



DENSE SPIKED ORCHIS.
(*Orchis intacta.*)

Leaves broadly oblong, largest at the base, decreasing in size upwards where they become narrower and more acuminate. Bracts one-nerved, shorter than the ovary. Lip three-lobed, lateral lobes short and linear, middle one either entire or notched.

This little plant, which has given a more than ordinary amount of trouble in classification, having been referred to no less than six genera, has recently been found in the

County of Galway, Ireland.* As will be seen from the above description, it is a small-growing species, the general habit and stature very nearly resembling the small white *Habenaria* (*H. albida*). Although rare in this country, having so far as is known but two stations, it is on the Continent commonly distributed, occurring in quantities in various parts of France, northern Italy, and along the Mediterranean coast generally. It also extends into north Africa and Asia Minor.

Limestone pastures seem the favourite haunts of this rather inconspicuous Orchid, although in various stations it is frequently found growing in soil entirely destitute of lime—a peculiarity that, as before stated, is shared in by various other species of *Orchis*. The flowers, which are produced in June in a dense spike, are more or less turned to one side, and the leaves are often, though not always, spotted.

By different botanists this species has been successively referred to several of the sub-genera of *Orchis*, and by others raised to a distinct genus under the name of *Tinea*, which has, however, been again changed to *Neotinea*, by Reichenbach. By removing carefully the roots of the Orchid it may be transferred to the garden, where it grows freely, but increases slowly.

* Found by Miss More at Castle Taylor, County Galway, Ireland. (Bentham's *British Flora*.) The specimen in the British Herbarium, Edinburgh, is dated 1864.

CHAPTER XVIII.

Genus 16.—SPIRANTHES.

Rootstock composed of tubers or stout fibres. Flowers small, in a more or less spirally-twisted spike. Column arching, with the anther hinged on to the back. Pollen masses four, sessile on one linear gland.

There are three species *S. autumnalis*, *S. æstivalis*, and *S. Romanzoviana*.

S. AUTUMNALIS. *Rich.* (Common *Spiranthes* or Lady's Tresses).—Root of two or three brownish, oblong, downy tubers, and producing several radical, ovate, rather glaucous leaves. Flowering stem issuing from the side of the tuft of leaves, usually about 6 inches in length, viscid and downy. Flowers arranged in a close half-spiral spike, small, white, and fragrant. Sepals and petals half erect, and uniting in a close hood over the lip. Lip channelled at the base, with the tip crenate.

A VERY pretty but small species of Orchid that occupies dry, hilly pastures and downs, where, from August to October, its deliciously fragrant flowers may not unfrequently be seen in considerable abundance. The root of this Orchid is composed of from one to three oblong or cylindrical tubers about $1\frac{1}{2}$ inches in length, rough or downy, and with very few fibres. From these proceed what may be best described as a tuft of rather small, oval, spear-shaped bright green leaves, that seldom exceed 1 inch in length. Alongside the leaves rises up the flower-stem to a height of 6, to sometimes, in very favourable situations, as much as 8 inches, with three or four spear-shaped pointed scales which embrace the stem. The flowers are arranged in a singularly half-spiral spike, about 2 inches in length, all diverging horizontally to one side and in a single row, while the bracts remain erect on the opposite side. In England it is fairly abundant, from Westmoreland and Yorkshire southwards to the Channel

Islands. It is also found, though not plentiful, in some parts of Ireland.

We have found this pretty and interesting Orchid to be readily enough cultivated by imitating as nearly as possible the conditions under which it is found naturally. Half-a-dozen specimens, carefully lifted and transplanted when in flower, have done well in a light, rather dry, loamy soil, and



COMMON SPIRANTH OR LADY'S TRESSES.

(*Spiranthes autumnalis*.)

produced for several years numbers of their ornamental and sweetly-scented flowers. This Spiranthe is, however, strangely uncertain in its appearance, places where it had been known to exist in quantity being, a year or two afterwards, destitute of even a single plant. In the summer of 1843, a field in the neighbourhood of Tunbridge Wells was so full of it that one might gather it at almost every step, but in the

August of the following year not a stem or leaf indicated that it had ever grown there. This sudden appearing and disappearing of several of our native Orchids should be a warning to cultivators not to disturb the soil in which they have been planted, for it is now well known that several species perfect their eye or shoot underground until a flowering stage is arrived at. This neat little orchid I found



SUMMER SPIRANTH.
(*Spiranthes æstivalis*.)

in great plenty in several parts of Kent, it being especially abundant on the high chalky cliffs along the sea coast near Dover.

S. ÆSTIVALIS. Rich. (Summer *Spiranthes*).—A taller species than the last, the rootstock more horizontal, with longer and more cylindrical clustered tubers. Leaves, narrow-lanceolate, usually larger than those of *S. autumnalis*, and clasping the flower-stem. Stem from 7 to 9 or

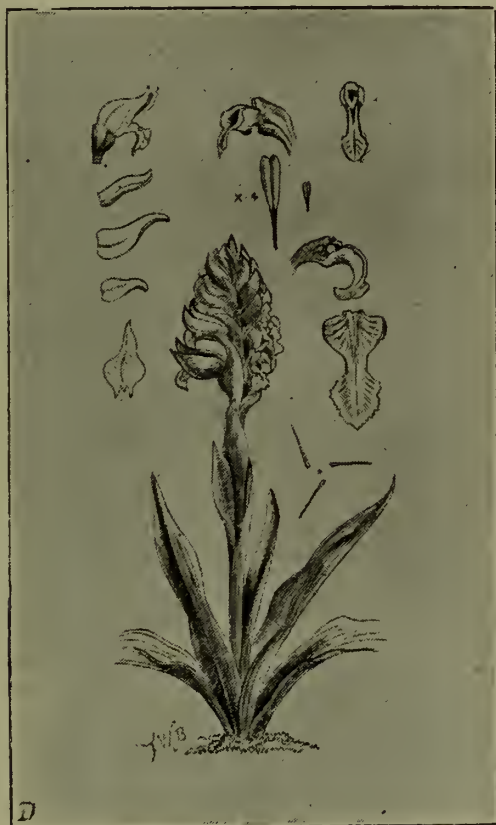
12 inches in length, and surmounted with a rather loose spike of numerous small white flowers, individually larger than those of *S. autumnalis*.

This plant, a native of damp, boggy ground, may be readily distinguished from the latter species by the flower-stem, which issues from the centre of the leaves, and is usually much taller. The leaves are long, narrow, and pointed; the lower pair short and rather blunt, those farther up much larger and more pointed. From ten to a dozen or more flowers compose the spike, these being large (in comparison with *S. autumnalis*), and loosely, irregularly, and spirally arranged. It is, in Britain, a rare plant, having only been recorded from Hampshire, Worcestershire, Kent, and the Channel Islands. On the Continent—especially in France—it is abundant, and is frequently imported in considerable numbers by plant-dealers. I have grown and flowered this species very successfully from tubers kindly collected by a friend in low-lying, dampish, heathy ground, in Camden Park, at Chislehurst. It reappears and flowers freely from year to year. This plant requires a damp soil, such as a mixture of leaf-mould and peat with a small quantity of sand, and to be planted in a shadyish situation. Flowering period, from July to August, much depending on the season, as well as altitude at which it is grown.

S. ROMANZOVIANA. *Cham.* Rootstock composed of two or more fleshy, cylindrical tubers, each from 2 to 3 inches long, and tapering very slightly downwards. Leaves, narrow lanceolate, usually five or six, ribbed, and clasping the stem. Flowers white, not unlike those of *S. autumnalis*, but much larger and broader, arranged in three rows, and forming a rather dense, ovate spike of from 2 to 3 inches in length. Bracts *smooth*, not hairy. Sepals and petals uniting in a close hood over the lip. Lip tongue-shaped, recurved at the tip, which is also slightly crenate, contracted in the middle, broader than in any of the other species, and almost pure white. The flowers are deliciously fragrant.

Rarer even than the latter species, this plant has but a few Irish stations—one a little meadow on the north side of Bantry

Bay, near Castletown, the others in the Counties Armagh and Londonderry. It is unknown elsewhere in Europe, but extends from the Atlantic to the Pacific in North America, its range, as given in the *Report of the Geological Exploration of the 40th Parallel*, being “Maine and Canada to Lake Superior, the Saskatchewan and Washington Territory; northward to Unalaska, and southward to California and Colorado. East



IRISH SPIRANTH.
(*Spiranthes Romanzoviana*.)

Humboldt Mountains, 6,000 to 8,000 feet, July—Sept.” This pretty flower is now almost, if not quite, extinct in one of its Irish stations, the place in which it grew having been drained and cultivated by its owner, as will be seen from the following letter received from Mr. W. E. Gumbleton, of Belgrove, on 1st September, 1886:—“I think it may interest you to know, and *perhaps* add to the value of the plants I sent you

last year, that in all probability *Spiranthes Romanzoviana* will very soon become extinct and no longer obtainable in the one locality in Europe, in the neighbourhood of Castletown, Beerhaven, to which it has hitherto been indigenous, as on writing recently to my agent, Mr. Barrett (who sent you the plants), to ask him to obtain a flowering specimen of this rare little terrestrial Orchid for Mr. Burbidge to draw, he sent me a letter from his friend Dr. Armstrong, who had collected the plants sent to you, that on going to the little boggy field where he had hitherto found it, he found the little plot ploughed up and planted with potatoes, and on going to the only other locality where he had ever found it—a narrow headland skirting a small wood—he found it turned up, and bearing a crop of oats.” Long ago, Grant Allen, in “Colin Clouts’ Calendar,” mournfully said that “the ardour of modern botanists is fast putting an end to its brief career” (but little did he then think that a far more speedy and sure method for its total extermination was so nigh at hand), and then adds: “this case presents some features of peculiar interest, because the Irish specimens would seem to have been settled in the country for a very long period, sufficient to have set up an incipient tendency towards the evolution of a new species: *for they had so far varied before their first discovery by botanists that Lindley considered them to be distinct from their American allies; and even Dr. Bentham originally so classed them, though he now admits the essential identity of both kinds.” The question, did it ever occupy other European territory, and did it migrate from America, or was the current in the opposite direction? are well worthy

* This plant was discovered by Mr. J. Drummond, on August 3rd, 1809 or 1810, and is referred to in his original journals as follows:—“The following day I spent on Bear Island, I found nothing new upon it, but I found a very curious species of *Ophrys*, which I believe to be new, upon the mainland opposite the western redoubt, growing in a salt marsh near the shore; it was in very small quantity, I only found two specimens.” (From a special memoir of the plant, written in 1844, by Mr. Babington.)

of consideration, and have already received attention ; for the latter writer affirms his belief that the seeds were carried across the ocean by chance at some remote period, and Professor Gray will have it that "these are merely the last, or among the last, lingering stations of a species once common to both continents." This little Orchid is therefore rendered of very considerable interest, not only on account of its extreme rarity and peculiar geographical distribution, but for the difference of opinion entertained by various botanists regarding its identity, and which latter will be seen from the following note extracted from a memoir of the plant, written by the late Professor Lindley :—"The first suggestion that is on record as to the relation of this plant is that of Smith, who compares it with *Sp. autumnalis* (his *Neottia Spiralis*), from which he separates it. The second is my own, that it may be identical with *Sp. Romanzoviana*. The third is that of Mr. Babington, who refers it unhesitatingly to the *Sp. cernua* of the United States, an old and well known species."

Bentham, in his last edition of the "British Flora," still retained the name of *S. cernua* ; and Hooker, in his "Student's Flora of the British Islands," adopts that of *S. Romanzoviana*. Apart from the above interests, this little plant has much to recommend it, for the white and deliciously fragrant flowers arranged in a spiral spike, are both effective and interesting. It may be successfully cultivated ; for Mr. Burbidge, of the Trinity College Botanic Gardens, Dublin, and whose drawing of the plant is here reproduced, informs me that he grew and flowered it well for some years. Half-a-dozen Irish specimens kindly forwarded to me by Mr. Gumbleton, have done well and flowered beautifully, planted out in their original sod of earth, and in a dampish, shadyish part of my garden, and where long may they remain as a living memento of a now almost extinct Orchid that had but one European station and that a British. The long grass surrounding the plants had best be carefully cut away at various intervals during summer, as under garden

treatment it is apt to become long and coarse and, in the end, smother and kill out the treasures it was intended to foster and protect. The same gentleman, to whom I am indebted for the above specimens, tells me that in Ireland this little plant is best known by the name of *S. Hibernicus*. Cold, damp bogs, in usually upland situations, are the favourite haunts of this interesting plant, and where, during the months of August and September, its rather inconspicuous though pretty and deliciously fragrant flowers (violet-scented) are to be seen.

Professor Macoun, of Ottawa, Canada, told me that he found it in great abundance in dampish, sandy ground by the Bow River, Silvertown, Rocky Mountains.

CHAPTER XIX.

CULTIVATION.

UNDER cultivation the majority of our native Orchids may be successfully grown either in the open border amongst herbaceous plants or on the rock-work with Alpines; but for various reasons, which will be explained hereafter, neither of these methods is so satisfactory or productive of such good results as when a bed is specially devoted to their culture. All the species may thus be brought directly under the eye of the cultivator, not lost sight of, as they are only too apt to be when placed either on the rockery or herbaceous border.

The Orchid bed, too, can be formed in a shady, quiet spot where the various qualities of soil may be placed in a very small area, so that different species of similar requirements can grow in close proximity. The position and preparation of the bed will, however, require a little attention, and may be readily formed in any half-shady corner (constant sunshine is inimical to the growth of several Orchids) by digging into the ordinary garden soil (which we will suppose in most cases to be loam) a quantity of peat or leaf-mould; this being a mixture suited to the wants of most species. In planting the tuberous or other roots, the requirements of each kind can, however, be readily attended to; it may be by adding lime or chalk to those requiring a calcareous soil, pure loam or leaf-mould where necessary, etc. Limestone blocks or boulders should, where obtainable, be half sunk in the bed in as natural a manner as possible, and against the sides of which those kinds requiring a calcareous soil may be planted with the best chance of success.

When forming this low rock-work, part of the bed should be raised above the general level of the surrounding ground, in order to meet the wants of those kinds requiring a dry soil and situation. The bed should also be carpeted with some low, creeping plants, such as the *Sedums*, *Arenarias*, *Campanula hederacea*, *Linaria alpina*, or *Anagallis tenella*, all of which are not only ornamental but preserve a cool, moist surface by preventing the too speedy evaporation of moisture, a matter of much importance for the healthy development of the plants. When planting the tubers, these should not be placed at a greater depth than from 3 to 4 inches. A few species, notably *Epipactis latifolia*, the *Cephalantheras*, and one or two others having fibrous roots, are, however, exceptions to this rule, and may, with advantage, be placed at a depth of 6 inches in the ground; but for the various species of *Orchis*, *Habenaria*, *Ophrys*, etc., the above specified depth should never be exceeded.

Although the majority of British Orchids are found in a somewhat stiff soil, still in my experience of them, when brought under cultivation, a fair admixture of sand is highly beneficial to most species; indeed I make it a rule when planting to surround the tuberous or other roots with a handful of rough grit, or sand, which not only to a great extent prevents decay, but materially assists in the formation of roots. This precaution is all the more necessary when planting imported Orchids, the roots of which have become damaged in transit or through carelessness in lifting.

With a little care, Orchids may be transplanted from their native wilds at any period of their growth even when in full flower; indeed, the latter time is preferable, as the strongest and healthiest plants can always be chosen, and usually any peculiarity of foliage or flowers is retained under cultivation. In removing the plants, great care should be taken not to injure the roots, as if these (more especially in the case of those having tuberous roots) become in the least damaged, the healthy development

of the new offset or root is prevented, although in many cases it may not in the least affect the flowering during the present season.

An ordinary garden trowel or hand-fork—the latter is preferable—may be used for lifting the plants, which should be taken up with a good circular ball, of, say, 4 inches in diameter (much depending on the size of the plant as well as formation of root), and carefully reduced until the root-lets appear in view; neither these nor the tubers, however, being made bare or exposed. The grassy surface should also be removed before planting, as, be this ever so dwarf in its native habitat, it soon becomes tall and rank when brought under cultivation, causing endless trouble, and often resulting in the death of the plants. Of those who have successfully cultivated most British Orchids, not the least remarkable, and perhaps the earliest, was Gerarde, who in 1597 mentions that he had then a plant of *Cypripedium Calceolus* in his garden, and also gives a remarkably accurate figure of the species. Later, about the beginning of the nineteenth century, a number of terrestrial Orchids, principally British and Silician, were cultivated successfully in the Botanic Gardens of Glasgow and Liverpool. About the same time (1824) a number of these plants, including *Orchis pyramidalis*, *O. latifolia*, *O. conopsea*, *O. morio alba*, *Habenaria bifolia*, *Aceras anthropophora*, *Herminium monorchis*, *Ophrys apifera*, *O. muscifera* and *Epipactis* (*Cephalanthera*), *grandiflora*, as well as a considerable number of North American species, were, it is said, “cultivated with perfect success in the Epsom nursery”; and at the same time most of our British Orchids “were cultivated and domesticated with satisfactory results” in the gardens at Welbeck. In the first volume of the *Horticultural Register*, published in 1831, a Mr. Thomas Appleby, of Horsforth Hall, is stated to have grown certain species of hardy Orchids very successfully in a newly-formed Rhododendron bed. The late Rev. H. Harpur Crewe, of Drayton-Beauchamp Rectory, was a great admirer as well as successful cultivator of these plants. He

succeeded in getting many of the species of *Orchis* to become established in his garden. A most interesting account of his experiments, with both failures and successes, was given in *The Garden*, volume 21. At Edge Hall, in Cheshire, the Rev. C. Wolley Dod has also been more or less successful with certain native Orchids, although his soil and situation are anything but favourable for their culture. At the Trinity College Botanical Gardens, Dublin, under Mr. Burbidge's care several rare native Orchids have been cultivated; but amongst all those enumerated, perhaps no one has grown these plants more successfully or enthusiastically than Mr. Elwes, of Preston, near Cirencester. The late Comte de Paris, when residing at Orleans House, Twickenham, had likewise a most interesting collection of hardy Orchids, principally the genus *Ophrys*, regarding which a great admirer of these plants records that "he had seldom seen a more beautiful sight than was presented by this collection." Numerous other examples might be adduced, but enough have already been given to show that these plants may, with a little care and trouble, be as successfully grown out of doors, as the epiphytal members are in our hot-houses. It is curious, however, that in some gardens certain species thrive luxuriantly, which in others cannot be coaxed into a short-lived existence. Did space and time permit me, I could enumerate gardens in which, taken collectively, all our native species, with perhaps three exceptions, are grown in the most successful manner. The *Helleborines* are especially difficult to manage; yet I know of one garden in which for years *Epipactis latifolia*, *E. ovalis*, *E. palustris*, and some of the *Cephalantheras* have flowered well, while in another, the rare and beautiful *Cephalanthera ensifolia* has become quite established, and runs wild in a rockery where it is almost stifled with the oak fern. The Man Aceras (*Aceras anthropophora*), a plant that is by no means easily managed, is quite at home in a Cheshire garden. No doubt soil and situation require careful consideration in the cultivation of British Orchids; but an equally, if not indeed more impor-

tant factor is the obtaining of sound well-rooted specimens with which to start, when, in my opinion, half the battle may be considered won. For many years I cultivated nearly every native species, thus showing that by studying their wants they may be very successfully grown.

Subjoined is a list of British Orchids arranged in sections according to their requirements of soil and situations, whereby at a glance any one who wishes to attempt their cultivation will see the conditions under which they are found naturally. Of course, it must not be inferred from the following list that several Orchids will only thrive under the conditions there specified, for some species, notably *Orchis mascula*, *O. maculata*, and *Habenaria bifolia*, are by no means fastidious about soil being found in all descriptions, from the finest loam to the stiffest clay; but that the following are the best conditions when brought under cultivation, has been proved on several occasions by those who have devoted considerable attention to this interesting class of plants. In conclusion, we feel justified in saying that the floral beauty of many of our Orchids far more than compensates for any little trouble incurred in their cultivation, and, speaking from our own experience, we have every reason to believe that any person giving these a fair trial will not be disappointed with the results.

SECTION 1.

Those which thrive in loam and limestone or chalk, with or without shade :—

Aceras anthropohora.
Cephalanthera ensifolia.
 ——— *grandiflora.*
 ——— *rubra.*
Cypripedium Calceolus.
Epipactis ovalis.
Herminium monorchis.
Ophrys apifera.
 ——— *aranifera.*

Ophrys arachnites.
 ——— *muscifera.*
Orchis fusca.
 ——— *hircina.*
 ——— *intacta.*
 ——— *militaris.*
 ——— *pyramidalis.*
 ——— *ustulata.*
Spiranthes autumnalis.

SECTION 2.

Those which thrive in loam and a shadyish situation :—

<i>Orchis conopsea.</i>	<i>Habenaria bifolia.</i>
—— <i>maculata.</i>	—— <i>albida.</i>
—— ——— <i>superba.</i>	—— <i>viridis.</i>
—— <i>mascula.</i>	<i>Listera ovata.</i>
—— <i>morio.</i>	—— <i>cordata.</i>
<i>Epipactis latifolia.</i>	<i>Neottia Nidus-avis.</i>
—— <i>rubiginosa.</i>	

SECTION 3.

Those which thrive in leaf-mould, peat, and sand, and usually deep shade :—

<i>Corallorhiza innata.</i>	<i>Malaxis paludosa.</i>
<i>Epipactis palustris.</i>	<i>Orchis latifolia.</i>
<i>Epipogium aphyllum.</i>	—— <i>laxiflora.</i>
<i>Goodyera repens.</i>	<i>Spiranthes æstivalis.</i>
<i>Liparis Loeselii.</i>	—— <i>Romanzoriana.</i>

CHAPTER XX.

FERTILISATION.

IN the whole vegetable kingdom there is perhaps no order of plants the structure of whose flowers is so anomalous as regards the relation borne to each other by the parts of reproduction as the Orchidaceæ. The necessity of insect agency in the fertilisation of these plants, although long hidden in obscurity, is now well known, and the many wonderful and beautiful contrivances as well as endless diversity of structure for the furtherance of this object, are so full of interest even to the general observer, that we may be excused for devoting, in conjunction with the notes on our native Orchids, a chapter to the subject. That cross-fertilisation is beneficial to most Orchids, indeed of the highest importance, may be inferred from the almost innumerable structures serving for this purpose which they present. Of the forty species of British Orchids, all, with two exceptions—*Ophrys apifera* and *Neotinea* or *Orchis intacta*—are entirely dependent on insect agency for their fertilisation and the perpetuation of their race; while four others—*Neottia Nidus-avis*, *Epipactis latifolia*, **E. ovalis*, and *Cephalanthera grandiflora*—although occasionally fertilised by insects, are also, though more or less in an incomplete manner, capable of self-fertilisation, so that, even if not visited by insects, a fair proportion of seed-bearing capsules are produced. As the method of fertilisation by the removal

* In all the specimens of *E. ovalis* that I have examined, the viscid matter is not sufficiently sticky to allow the withdrawal of the pollinia. Self-fertilisation, however, takes place by the pollen falling spontaneously on the stigma.

of the pollinia by insects is much alike in all our native Orchids, and also that to describe even one species of each genus would occupy more space than is at our disposal, we, therefore, purpose describing, in as concise and plain a manner as possible, the action of the organs of fertilisation in our commonest native species, *Orchis mascula*, and at the same time briefly pointing out some of the differences which exist between it and other members of the family. The frontispiece illustrations, without which we find it almost impossible to convey a clear description, of the method of fertilisation, have been kindly drawn and lent to me by E. C. Malan, M.A., F.L.S., of Cheam, and represent the various parts of the flowers of *O. mascula*, much enlarged. In Fig. 1 (where we are supposed to be looking into an open flower, the sepals and petals of which, except the labellum, have been removed), above the entrance to the nectary, which, as a well as the ovarium, is here hidden from view, and immediately under the pouch-formed rostellum, will be seen the bi-lobed stigma, a surface so sticky as to retain whatever substance comes in contact with it, such as dust, small insects, or the properly-placed pollen. The anther, which consists of two separate cells, each containing a pollen mass, or pollinium, is situated above the rostellum. A pollen mass, or pollinium (Fig. 2), consists of a number of pollen grains fastened together by very elastic threads; a caudicle or footstalk; and a minute piece or disc of membrane with a ball of viscid matter on the under side. The pollinia have separate discs and are enclosed and kept moist by the rostellum.

How this somewhat complex mechanism acts (and Fig. 3 will serve to explain it), we will now describe in the words of Darwin: "Suppose an insect to alight on the labellum, which forms a good landing-place, and to push its head into the chamber (see side view Fig. 3, or front view Fig. 1), at the back of which lies the stigma, in order to reach with its proboscis the end of the nectary; or which does equally well to show the action, push very gently a

sharply-pointed common pencil into the nectary. Owing to the pouch-formed rostellum projecting into the gangway of the nectary, it is scarcely possible that any object can be pushed into it without the rostellum being touched. The exterior membrane of the rostellum then ruptures in the proper lines, and the lip or pouch is easily depressed. When this is effected, one or both of the viscid balls will almost infallibly touch the intruding body. So viscid are the balls, that whatever they touch they firmly stick to. Moreover, the viscid matter has the peculiar chemical quality of setting, like a cement, hard and dry in a few minutes' time. As the anther cells are open in front when the insect withdraws its head, or when the pencil is withdrawn (Fig. 4), one pollinium or both will be withdrawn, firmly cemented to the object, projecting up like horns, as shown in Fig. 4. The firmness of the attachment of the cement is very necessary, for if the pollinia were to fall sideways or backwards, they could never fertilise the flower. From the position in which the two pollinia lie in their cells, they diverge a little when attached to any object. Now, suppose that the insect flies to another flower, or let us insert the pencil (Fig. 4) with the attached pollinium into the same or into another nectary; by looking at the diagram (Fig. 3) it will be evident that the firmly-attached pollinium will be simply pushed against or into its old position, namely, into the anther cell. How then can the flower be fertilised? This is effected by a beautiful contrivance; though the viscid surface remains immovably affixed, the apparently insignificant and minute disc of membrane to which the caudicle adheres, is endowed with a remarkable power of contraction which causes the pollinium to sweep through an angle of about 90 degrees, always in one direction, viz., towards the apex of the proboscis or pencil, in the course of 30 seconds on an average. The position of the pollinium after the movement is shown in Fig. 5. After this movement, completed in an interval of time which would allow an insect to fly to another plant, it will be seen, by referring

to the diagram (Fig. 3), that if the pencil be inserted in the nectary, the thick end of the pollinium now exactly strikes the stigmatic surface." The stigma itself, although very viscid, is not sufficiently so to pull the whole pollinium from the insect's head, and yet sufficiently viscid to break the elastic thread and retain a sufficient quantity of the pollen to fertilise the flower. One pollinium, therefore, suffices to fertilise several flowers. The pouch springs back after being depressed so as to keep the other pollinium (if only one has been removed) moist.

During the summer of 1885, I met with a very remarkable specimen of *Orchis mascula*. The stem, which was a foot in height, bore eight flowers (two had been broken or eaten off), but instead of the usual number, sixteen, contained no less than forty pollinia. Six individual flowers contained six pollinia each, and the remaining two the usual number, viz., two each. One of the flowers had two lips, both almost perfectly formed, and, strange to say, the remaining sepals and petals were normal. The rostellum was, however, much enlarged, almost closing up the entrance to the nectary, and contained the rudimentary traces of a pistil. This latter was observable in two of the flowers, and issued from between the stigmatic surfaces. The pollinia were, as usual, enclosed in the anther cells, but only in the two centre ones were the viscid discs protected by the rostellum. There is one fact in connection with this flower which seems more in favour of Dr. Crüger's opinion than that of either Brown, Lindley, or Darwin. These three observers have stated that the two lower stamens are invariably petaloid and form part of the labellum. Now in support of Dr. Crüger, who will not admit that the labellum is thus formed, it may be argued that here is a flower with not only the original number of stamens but the lip also, and in one case two, perfectly developed, which we could hardly expect if that organ is, as Darwin and the others state, composed partly of the two lower stamens.

Little difference exists between the actions of the organs of *O. mascula*, and those of *O. fusca*, *O. morio*, *O. maculata*, *O. latifolia*, *Ophrys aranifera*, *O. muscifera*, and *Herminium monorchis*. In *Orchis pyramidalis*, however, there is but one viscid disc which is saddle-shaped instead of, as in *O. mascula*, where there are two rounded, and the pollinia after becoming attached to an object not only undergo the regular act of depression, but are previously, by the curling or clasping movement of the viscid disc, caused to diverge to the proper angle so as to strike the two lateral stigmas. *O. ustulata* and *O. hircina* resemble the latter species in the pollinia arising from a single disc, but only in *O. ustulata* does a slight divergence of the pollinia take place. In *O. intacta* the pollen from being extremely incoherent falls spontaneously on the stigma, and the plant therefore produces seed without insect aid. *Ophrys apifera* affords another example like the latter of self-fertilisation, for the anther cells naturally open and the masses of pollen from their own weight fall down to the exact level of the stigmatic surface, and are there made to vibrate by the slightest breath of wind until the stigma is struck. It is curious that both these species, although constantly self-fertilised, still retain various structures which it is impossible to doubt are adapted for ensuring cross-fertilisation, though they are now rarely or never brought into play. *Orchis conopsea* and the three species of the genus *Habenaria* have the viscid disc uncovered, but the pollinia go through the same act of depression as in a true *Orchis*, and the flowers are effectually fertilised by insects.

Cephalanthera grandiflora, although destitute of a rostellum, is constantly self-fertilised while in the bud state by the emitting of a multitude of tubes from the pollen grains. The structure and manner of fertilisation in *Epipactis latifolia* and *E. palustris* is both complicated and beautiful.

The usual movement of depression in the pollinia of these two species does not take place, which may also be said of the genus *Spiranthes* and *Goodyera*. *Epipactis latifolia* is,

however, frequently self-fertilised by the pollen falling spontaneously on the stigma. It is also a curious fact in connection with this plant, that the nectar should be so highly attractive to the red-tailed humble-bee that cannot fertilise the flower, while to the wasp that can remove the pollen masses with ease, and thereby ensure cross-fertilisation, it offers but little attraction, as is clearly shown by the almost total absence of its visits.

Having during the past few years, but particularly the summer of 1885, devoted considerable attention to the above interesting subject, I have thought the following observations not unworthy of record, as contributing to a subject which as yet has received little investigation. In the woodlands of Carnarvonshire, where the plant grows in unusual quantity, exceptional opportunities have been afforded me of studying it under various conditions as to soil, altitude, and situation.

All, or nearly all, my observations tend to show (1) that *Epipactis latifolia* is very imperfectly fertilised; (2) that although visited by insects, cross-fertilisation seldom takes place; and (3) that self-fertilisation by the the pollen falling spontaneously on the stigma is not uncommon.

1. That the plant is very imperfectly fertilised is evident from the small quantity of seed produced. On examining nearly one hundred plants, when the seeds were ripe, in October, I was surprised at the small number of capsules produced. (The ovules of unfertilised flowers drop from the plant at an early date, thus affording an unerring guide as to the difference between barren and well-filled capsules.)

I examined nineteen plants growing in consecutive order in one wood, and out of a possible 492 capsules only 38 produced seed. Thinking that perhaps the density of foliage or maritime situation might account for this unusually small production of seed, I examined the plant in quantity in two other warm, shady woodlands, but with almost similar results. Sixteen plants, growing within a short distance of each

other, produced only 32 capsules from 516 flowers; while in another wood similarly situated 26 were produced out of a total of 215. This small production of seed, in an unusually fine season, clearly proves that *Epipactis latifolia* is very imperfectly fertilised, and, as will be seen hereafter, that cross-fertilisation by insect agency seldom takes place. The conclusions naturally arrived at are, that this Orchid is more frequently self than cross-fertilised, but when the small production of seed is taken into account, very imperfectly by either method.

2. That, although visited by insects, cross-fertilisation seldom takes place, is proved by the following observations:—Amongst insects of sufficient size to remove the pollinia that I have seen visiting the flowers of this *Epipactis*, I may mention the red-tailed humble-bee and our common wasp, the latter, however, but very rarely. On the other hand, the red-tailed humble-bee visits the flowers of this plant frequently, but, owing to its peculiar method of sipping the nectar without entering the flower, never removes the pollinia. On August 21, 1885, being in a wood where beds of this plant were in full flower, I saw the above bee enter several flowers on two different plants growing side by side, without in any case removing the pollinia. On the 24th of the same month, and in the same wood, I saw a red-tailed humble-bee visit successively no less than sixteen flowers on a spike of this *Epipactis*, without removing any of the pollinia. In this case the spike of flowers was so dense that the bee crawled from one to the other in a spiral fashion from bottom to top without once bringing its head or proboscis in contact with the viscid disc at the base of the pollinia. After sucking the nectar from the last flower, it flew off for a few yards, but immediately returned and revisited three of the same flowers, but this time in a half-discontented fashion, as if striving to improve on work that had been already well done. Again, on the 26th of the same month, I saw several visit the flowers of this plant (one visited most of the flowers on seven plants in succession) without

removing the pollen, although, being near, I noticed them visit numerous flowers that contained the pollen masses. The bees hung on the distal portion of the labellum, and inserted their long proboscis without the head coming in contact with the viscid disc. The evening was lovely, and I spent an hour watching the plants, but during that time, although wasps were flying about in number, not one visited a flower. (This certainly was the opposite of what I expected, as several naturalists are under the belief that this *Epipactis* is constantly fertilised by this insect, one indeed going so far as to say that if wasps were becoming extinct in any locality, so, in all probability, would *Epipactis latifolia*.) On other occasions, however, I did see the common wasp visit several flowers, but the visits were short, and if I may use the expression, heartless, as if it could derive little therefrom. Owing to their long, narrow shape and short proboscis, wasps remove the pollen masses with ease, for I have caught them immediately after coming out of the flower with the pollinia attached to their head; but as these visits are few and far between, fertilisation by this way is of rare occurrence. In numerous instances, also, the pollen masses will be found glued to the upper sepal of the flower, which is done as follows:—The wasp on entering, particularly a newly open flower, gets the pollinia attached to its head when sucking the nectar; but immediately on entering another flower, the upper sepal is so situated that the sharp stiff edge comes in contact with the viscid substance, which, with the pollinia, is left attached to it. This I have never seen take place, but repeated experiments bear out the statement. It is also readily illustrated with a pencil. In various other parts of the plants it is not uncommon to find the pollen masses attached as if the discs were not sufficiently viscid to retain their hold on the insect's head, and on more than one occasion I have found them unbroken, on their stigmatic surface. Small insects also visit the flowers in numbers, as I have watched them creeping about within the labellum and other parts; but in numerous

instances many of those which come in contact with the viscid stigma are unable to free themselves, and so perish. The largest insect that I have seen killed in this way was $\frac{3}{16}$ of an inch in length. When the plants begin to wither, or immediately after fertilisation takes place, the distil portion of the labellum curves upwards, and effectually closes the entrance to the basal portion or nectary, but for what end I am unable to say.

3. That self-fertilisation by the pollen falling spontaneously on the stigma is not uncommon. I have frequently observed that the pollen masses in a few days, or perhaps a week after the flowers open, become swollen, or the particles of pollen disunited so as to protrude slightly beyond the sharp upper edge of the stigma. At the same time, or later on, the pollen becomes remarkably friable, and before the plant withers, either spontaneously or by the action of the wind, falls on the stigma and other parts of the flower. The peculiar position of the pollen masses—hanging directly above the stigmatic surface—ensures this the more readily. That the pollen masses become detached and fall apart is beyond dispute, as I have on many occasions found the grains scattered over the leaves, flower, and stem of the plant, as well as, in one or two instances, noticed the pollen masses still within their cells, but with the corners broken off and lying on the stigmatic surface. This breaking up of the pollen masses may be spontaneous, but it is materially assisted by both wind and rain.

On examining numbers of the plant, I have found it a general rule that the entire pollinia, or a large part of them, have not been removed from such flowers as bear well-filled capsules. Now this of itself seems to me to indicate self-fertilisation by particles of the pollen falling on the stigma, for it is quite evident that if wasps (the only insect, so far as is known, that in this country does fertilise the plant) visited and impregnated the flower, they could hardly have avoided removing the pollinia. To make sure, I examined several withered flowers with swollen ovaries on

different plants, and was surprised to find that in most cases remnants of the then musty pollen could be distinctly detected within the shrivelled anther.

After reading the above remarks, one is naturally led to ask:—Why, if *Epipactis latifolia* is so imperfectly fertilised, is the plant so abundant?

This I can only answer as follows:—(1) Nature, as if to make up for the small production of seed, has endowed this plant, unlike the generality of our native Orchids, with special facilities for the perpetuation of its race. The original roots do not, as in most other Orchids, die off annually, but serve for collecting nutriment for the succeeding plant, the eye or bud of which is formed close to the old or last year's stem. At times the plant produces several of these eyes in one season; indeed, during the present summer, I counted sixteen and twenty-six flowering stems on two plants, and it is not at all uncommon for three or four stems to be found attached to the same plant. (2) Each capsule (judging by the number in the almost equally sized *Cephalanthera grandiflora*) will contain about 6,000 seeds, so that even if one only were produced on each plant, it would be more than sufficient to keep up the stock.

In conclusion, one cannot but wonder how remarkable it is that the nectar of *Epipactis latifolia* should be so highly attractive to the red-tailed humble-bee that cannot fertilise the flower; while, to the wasp that can remove the pollen mass with ease, and thereby ensure cross-fertilisation, it offers but little attraction, as is clearly shown by the almost total absence of its visits. I have mentioned above, that, under certain conditions, the roots of this plant produce eyes or buds, but, strange as it may appear, this is not the case in all, for I have examined numbers without any such means of reproduction. In many instances, also, indeed it is the general rule in most districts that the plant in question is destitute of a rostellum, the viscid matter at the base of the pollinia being free or uncovered, thus imitating in

structure the degraded and self-fertilised *Cephalanthera grandiflora*.

Now, can it be that *Epipactis latifolia* from not being sufficiently attractive to insects, or from the want of proper insects in this country to fertilise it, is gradually becoming modified, and propagation by increase of the root slowly but surely taking the place of seed, or at least materially assisting to prevent the extinction of the plant, as would in all probability result from the present imperfect fertilisation and subsequent small production of seed? This is rendered all the more probable by the curious fact that, in most, if not all, of our native Orchids that are either partially or wholly self-fertilised, nature, as if to make up for the small production of seed, has endowed them with special facilities for perpetuation—namely, by increase of the root.

Take the example of *Neottia nidus-avis*, which is very imperfectly cross-fertilised, but in which nearly all the rootlets produce young plants; also that of *Epipactis latifolia*, which, under certain circumstances, behaves in a similar manner. Again, *Ophrys apifera*, which is perhaps the most noted example of constant self-fertilisation in British Orchideæ, is well known to appear and disappear somewhat mysteriously from certain localities, by the young tubers increasing beneath ground until of a flowering size; *Cephalanthera grandiflora*, which is fertilised in the bud state by the emitting of tubes from the pollen grains, also increases by the root, but of this rare species I am able to give little original information.

The genus *Cypripedium*, of which we have but one British representative (*C. Calceolus*), differs in a remarkable degree from any of those already described. In most British Orchids, the stigma is viscid and more or less concave, and the grains of pollen united together in dry masses; whereas in *Cypripedium* the reverse of this is the case, the stigma being slightly convex and non-viscid, and the pollen grains coated by and immersed in viscid fluid. The labellum forms a large inflated pouch, the basal part of which is folded round

the column so that its edges nearly meet along the dorsal surface, while the extremity is folded over, thus forming a sort of shoe, which suggested not only the English name of the genus—Lady's slipper—but also the Latin *Cypripedium*, or Venus's slipper. The opening into the slipper from being partly closed by the stigma has a horse-shoe like form, and, owing to the edges of the labellum being much inflected, insects which have once entered the flower experience no little difficulty in escaping by the same way, but, unless in the case of very large insects, are compelled to crawl out by one of the two small orifices close to the anthers. In doing this, they inevitably come in contact with and carry off some of the glutinous pollen.

I have repeatedly caught small bees and placed them within the labellum of *Cypripedium Calceolous*, growing in my own garden, and thus clearly saw the whole method of fertilisation. The bee, after repeated attempts to get out by the way it entered, which it could not owing to the edges of the labellum being inflected, at last forced its way out through one of the small openings close to the anthers. The inner surface of the labellum is, I have also noticed, covered with minute hairs which, from being recurved or inclined downwards from the large opening in the labellum, also prevent the insect that has once entered from escaping by the same orifice.

In Britain at least it is extremely improbable that *Cypripedium Calceolus* ever becomes fertilised, for it is hardly to be supposed that an insect after experiencing the difficulty of escaping from the labellum would immediately turn round and revisit the same flower, and the present scarcity of the plant in a wild state certainly precludes the possibility of the same insect visiting other flowers. Where, as on the Continent, numbers or beds of this *Cypripedium* grow together, cross-fertilisation is, no doubt, effected by insects visiting different flowers at intervals, but where, as in this country, the plants are limited to one or at most two stations, the chances of fertilisation taking place are certainly few and

far between, so that, unless by increase of the root, the fate of this handsome indigenous species is but a question of time. In my own garden I have had several flowers of this plant open at the same time, but even during the brightest of weather, and when insects were more than plentiful, I have never seen one enter the labellum, nor has any of the plants been fertilised. In many instances I have seen small insects hover over the flower, but the attractions to enter seemed, from their short visits, to be few indeed. Having had, at various times, most of the Orchids just treated of under cultivation, ample opportunities were afforded me during leisure hours of investigating, by the help of Darwin's valuable work on that subject, their peculiar structure and methods of fertilisation, an occupation which I must say has afforded me no small amount of pleasure as well as instruction.

The following notes have been made at various times as opportunities offered over a period of several years, but principally during the present season, as exceptional opportunities were afforded me of studying the plant in a semi-wild state. Nearly two dozen flowers were produced by established, out-door specimens of this *Cypripedium* and its near^y American ally *C. parviflorum* (some botanists consider the latter a continental variety of *C. Calceolous*; and as regards structure, mode of growth, and time of flowering, the two are nearly identical). Two strong, healthy plants that had been established for several years were marked off for investigation as regards time of appearing, rate of growth, period of flowering, and method of fertilisation; and the following diary, kept from the time the buds appeared above the ground until the flowers had withered away, may be useful in following out the life history of this singularly interesting plant. The bud, remarkably plump and healthy looking, appeared above ground on 19th April, 1886.

On 26th April it was $2\frac{1}{2}$ inches high, the weather during that time being very favourable for growth, with warm,

sunny showers. On 3rd May the height was $4\frac{3}{4}$ inches, and the leaves were beginning to open out from the stem. On 10th May it was 8 inches high, and thus showed a growth of $3\frac{1}{4}$ inches in six days.

At this stage the lower leaves were almost perfectly developed and the flower-bud visible. On 17th May the height was 9 inches, the leaves being fully developed, and the flower-bud plainly visible. On 24th May the full height, $12\frac{1}{2}$ inches, was attained, at which period the flower was fully developed and half open. This was the greatest rate of growth during any week, although only one-quarter inch more than during the six days from 3rd May to 10th May. During the five weeks from 19th April, when the bud first appeared, until 24th May, when the plant and flower was fully developed, the weather was satisfactory for growth. The flower remained open for twenty days, or until 12th June, when it collapsed.

As regards fertilisation, I may state at the outset that no native Orchid on which I have experimented is more difficult to understand, or has more completely baffled my observations, than this. That Darwin's description of the wonderful manner in which the pollen of this Orchid is removed by insects is true, I am, however, well able to corroborate, for on several occasions I have seen insects visit the flower by the large opening in the labellum, and after repeated failure to get out by the same way, owing to the inflected edges, at last force themselves out by one of the two orifices close to the anthers, and in doing so their backs were smeared with the glutinous pollen.

This part of the work, the removing of the pollen, is neatly enough performed, but how the pollen is to be brought in contact with the stigma has puzzled me greatly. It is quite evident that unless the same insect visits another, or revisits the same flower, fertilisation cannot take place, and from all my observations that such is likely to occur is very improbable, although by no means impossible, for the following reasons:—

1. The difficulty of escape experienced by an insect that visits the flower.

2. Only those insects which experience the greatest difficulty can remove the pollen.

1. When an insect of sufficient size to remove the pollen enters the labellum of the flower by the large opening at the top, I have invariably noticed that its first aim is to escape again, for a search after nectar seems out of the question. In all cases that have come under my own notice, the insect first tries, for several times in succession, to escape by the way it entered, but the edges of the labellum are incurved, and the numerous fine hairs within the flower are pointed downwards from the edges on each side, so that escape by scaling the sides is well-nigh impossible. I have seen on different occasions several insects, after much labour, ascend the edges of the labellum, but when they came to the incurved edges, which may be considered the special barrier, back they fell into the bottom of the labellum. I have seen this repeated several times by the same insect, until, tired and disgusted, the attempts to escape by this way were given up. Next, the insect, allured, no doubt, by the light emitted through three colourless, almost transparent, lines at the upper end of the labellum, crawls towards these, but by this way also finds escape out of the question. These light lines, however, have conducted the insect to near the upper end of the labellum, and within a short distance of the two small orifices, situated one on either side of the anthers. A rush is now made for exit by this way, and as the hairs here point in the opposite direction to those on the flat sides of the labellum, the insect crawls easily up to the small orifice, and after two or three attempts forces its way out. In so doing it becomes smeared with the pollen, with which it inevitably comes in contact, the anthers being placed directly above the small orifices and under the stigma.

The pollen is so sticky and the orifices so small that insects (small bees excepted) which come in contact with the former are frequently unable to free themselves, and so

perish. Again, I have frequently found insects, that were of too large a size to escape by these orifices, dead within the labellum.

Now, from these observations, it is hardly to be expected that an insect, after once experiencing the difficulty of escape from the labellum, would turn round and revisit the same flower or that on another plant; indeed, in all the instances that have come under my own notice, the insect's escape from this temporary prison was quickly followed by desertion of the locality in which the plants grew.

That cross-fertilisation is thus effected to any great extent I cannot think; and although Darwin and others have seen insects visit the flowers of this *Cypripedium*, and escape with pollen attached to their back, it is not on record, and I believe no one has yet seen the same insect visit another flower or revisit the same one. The temptations for insects to visit the flower are, likewise, small indeed, for I have frequently watched for hours, during bright sunny weather, when insect life was abundant, their visits to the various alpine plants growing in close contiguity, but rarely did one approach the score of *Cypripedium* flowers in full bloom. Occasionally I have seen insects alight on the labellum, but the temptations to enter the flower must have been few, to judge from their speedy departure.

2. Only such insects, as experience the greatest amount of difficulty in escaping from the flower can remove the pollen.

When small insects, even up to the size of our common brown ant, enter the flower, and creep out again by either of the orifices near the anthers, their backs will not come in contact with the pollen, as the distance between this and the portion of the labellum on which they tread is too great, being in most specimens that I have measured one-eighth of an inch.*

Small bees, such as the sand-wasp and others, are of the size to remove the pollen, but then the difficulty they experience in escaping is great. I have placed several of

* A specimen, with the glutinous pollen attached, was sent for identification to Professor Westwood, who named it *Syrphus syzittapiensis*, Linn.

these within the labellum of the flower, and saw them force their way out besmeared with the pollen, but usually a good deal of time and great effort is expended in thus effecting an escape, and, to my mind, impresses the insect with the idea not to venture into such a trap again.

From all my observations, then, I incline to think that but little temptation to visit the flower is offered to insects, and that from difficulty of exit; insects which have once entered this prison chamber are not likely to do so a second time. But it may be asked, If the fertilisation of *Cypripedium Calceolus* is so imperfectly performed, how is the plant so abundant on the Continent? To this I would reply that, like *Epipactis latifolia*, nature, as if to make up for imperfect fertilisation, has endowed this plant with a peculiarly safe method of reproduction, viz., by increase of the root; for, when favourably situated, established plants of this *Cypripedium* increase rapidly, single crowns soon spreading over a wide area.

In *Listera ovata* and *L. cordata*, the structure of whose flowers is essentially the same, as also indeed is that of *Neottia Nidus-avis* which has special adaptions for the fertilisation of the plants, the action of the reproductive organs is both curious and instructive. As soon as the pollinia have become attached to an insect's forehead, the rostellum suddenly curves downwards so as to project at right angles over the stigma, thus protecting it from impregnation at an early age, and also to a greater or less extent preventing self-fertilisation. In the course of a day, however, the rostellum not only recovers its original position, but stands upright, leaving the stigmatic surface perfectly free for pollen to be left on it by the first visiting insect. This is, perhaps, the most remarkable, as regards structure and adaptation of one part to another, of our native Orchids, and also one that is readily examined by any person wishing to observe the method of fertilisation.

Malaxis paludosa, with its upturned labellum, is freely fertilized by insects, to which the flowers are highly attractive.

CHAPTER XXI.

ENEMIES.

THE enemies of our native Orchids are by no means few, and include, amongst others, such formidable opponents as the common field mouse, slugs, and wireworms. Field mice are very destructive to the tubers of various Orchids, particularly *Orchis mascula*, *O. maculata*, *Habenaria bifolia*, &c.; indeed, I have frequently noticed large patches of *O. maculata* killed outright by the ravages of these highly destructive animals. One case, which came under my own observation, may be cited as an example: an unusually fine patch of the latter-named Orchid, in the Park at Penrhyn Castle, produced, during the summer of 1883, fully two hundred flower-stems, on an average 30 inches high each. Fine stately bright-flowered specimens they were, that raised in a very conspicuous manner their long purplish spikes far above the surrounding bramble, bracken, and grasses, and clearly demonstrated the particular quality of soil—an unctuous yellow loam—and general surroundings that suits best this one of the noblest of Orchids.

In the following spring, when Orchids were appearing in all their leaf beauty, hardly a plant marked the spot where flourished in such wild luxuriance, and, but a few short months before, what I am just in describing as the healthiest and handsomest clump of Orchids that it has ever been my privilege to behold, brown withered stems, surmounted by empty seed capsules, alone directing us to where they formerly grew. Curious to find out the cause of such an off-falling in their numbers, I examined several of the roots, and, much to my surprise and regret, found that in nearly every case the large, plump tubers had been eaten wholly up by bands of field mice, and which was only too apparent from

the neat little holes, of about an inch diameter, that had been excavated in a perpendicular manner down to the tubers and alongside the previous year's stems, these latter, no doubt, acting as an unerring guide to where the roots were to be found. On lifting some of the roots, the whole of the thick, fleshy portion, was entirely eaten away, nothing save the bud, the outer skin, and long rootlets being left. The Orchid in question seems far more susceptible to attacks from mice than almost any other species, although similar depredations, though in a less wholesale manner, we have more than once noticed in the case of *O. mascula*, *O. conopsea*, and *Habenaria bifolia*.

The slug is a dread enemy to the leaves and sometimes tubers of British Orchids generally. We have more than once been annoyed to find that night after night the leaves of *O. mascula*, *O. morio*, *O. pyramidalis*, *Ophrys apifera*, and *Goodyera repens* disappear as if by magic, these gardeners' foes, as the slugs are rightly called, lying in well-concealed ambush, close to the Orchid bed, and from which hiding places they make frequent nocturnal raids upon the unfortunate plants until all are either eaten up piecemeal, or so nibbled and destroyed as to be rendered quite incapable of perfecting their tubers for the following season's plant.

Not unfrequently have we found slugs forcing their way down the opening in the ground made by last year's stem to feast on the Orchid roots, just as we occasionally see them doing in the case of potatoes and other garden vegetables.

Many a fine, plump bud of the Lady's slipper, *Cypripedium Calceolus*, as well as procumbent stem of the sweet little creeping *Goodyera*, *G. repens*, have we found half eaten away by the slug, the damage thus caused in infancy being rarely fully set forth until the plant has attained full dimensions, when the riddled leaves and deformed flowers tell but too plainly what is to blame.

More vexing is it still to have watched proudly for a whole season the growth of a rare and favourite Orchid, and just as the long-looked-for flowers of quaint colours and

peculiar shape are about to expand, to find some morning that the spike has been laid low by the mischievous slug. Wireworms are, likewise, but not in all soils, the cause of much injury to Orchid roots by boring into these immediately under the eye or bud, the result being weak growth, or, in many cases, no growth at all. The Butterfly *Habenaria*, *H. bifolia*, is especially liable to the attacks of wireworms, numbers of fine, healthy plants being killed outright annually by these Orchid pests, as, likewise, by a small maggot or grub, that not unfrequently accompanies the wireworm in its work of destruction. A consignment of the so-called *H. Chlorantha*, collected in the Highlands of Scotland and sent to me from Rockville, by Mr. P. Neill Fraser, as, likewise, a number of plump, healthy looking roots of the marsh *Orchis*, *O. latifolia*, were entirely destroyed in the same season by these worms.

Remedies for such evils are, however, not entirely wanting for we have found a wonderful deterrent, both to slugs and wireworms, in a handful of rough, gritty sand, placed either around the tuber to prevent the depredations of the latter, or over the young and tender bud when just appearing above ground, to guard off the ever-watchful, night-wandering slug. Even after full-grown plants have been nibbled and half eaten by these latter, a surface dressing of coarse sand or old lime rubbish has a wonderful effect in staying further molestations, slugs evincing a marked dislike to come in contact with either of such surfaces.

The oft-recommended soot recipe we have tried more than once, but invariably, with the result that when fresh it is excellent, but when a week old, but particularly during wet weather, its good properties are well-nigh exhausted.

Mice are not so readily kept at bay, but as their ravages are principally confined to Orchids in a state of nature, and but seldom to garden-grown specimens, the damage inflicted on the latter is rarely of a serious character, and may be readily enough counteracted by any of the means usually adopted for destroying these in our houses.

CHAPTER XXII.

DISTRIBUTION.

THE distribution of Orchids in Britain, as will be seen from the foregoing notes, is somewhat remarkable, thirteen species being confined to England alone, two to Scotland, and two to Ireland. Again, seventeen other species are common to the three countries, while four are confined to England and Ireland.

England may thus well be reckoned as the Orchid country of Britain, the chalky downs of Kent and Surrey being extremely rich in these floral treasures.

The rare and curious *Epipogium Gmelini* has been found only in two stations, one of these at Tedstone Delamere, in Herefordshire; *Spiranthes æstivalis* in the New Forest, Hampshire, and one or two other stations; *Liparis Loeselii* in some of the bogs of Cambridge and adjoining counties; *Orchis laxiflora*, in the Channel Islands; while *O. fusca*, *O. militaris*, *O. ustulata*, *O. hircina*, *Cephalanthera rubra*, *Ophrys aranifera*, *Herminium monorchis*, *Aceras anthropophora*, and *Cypripedium Calceolus* are all rarely distributed, but principally through the southern and south-eastern counties. In Scotland alone do we find homes for *Corallorhiza innata* as well as the only evergreen species of which Britain can boast, the sweet little creeping *Goodyera*, *G. repens*, both of which are fairly abundant in several counties, the latter extending sparsely into Northern England. Ireland, again, produces the rare *Spiranthes Romanzoviana*, a plant that has been found nowhere else in Europe; its nearest known stations being a few of the cold, upland bogs of North

America. This plant is certainly remarkable as being the only native Orchid that can boast of having but a single station in Europe, few other British plants sharing a like honour with it.

Another Irish Orchid, *O. intacta*, found but a few years ago at Castle Taylor, in the County Galway, has only one other station in the British Isles, its nearest recorded places of abode being along the Mediterranean coast and south-western Europe generally.

In concluding these rather brief remarks on our native Orchids my greatest wish is that no word of mine regarding the habitat of any species, rare or common, will sound the death knell for its extermination, but rather stimulate the desire for further investigation and research, as I have no doubt, judging from my own experience, that several species are to be found in districts other than those recorded. The partial, indeed in some cases complete, extermination of some Orchids, as well as other plants, renders the formation of a society for their protection almost imperative, for it is hardly in keeping with we British as a nation of botanic learning to stand aside and see name after name blotted out from the flora of our country. Grant Allen tells us that the English Lady's slipper, *Cypripedium Calceolus*, now lingers but two in places, one of these "a single estate in Durham, where it is as carefully preserved by the owner as if it were pheasants or fallow deer." At one time, this pretty plant was fairly abundant in several stations of at least three English counties—Durham, Lancashire, and Yorkshire—but now, alas! it is very questionable if even a single specimen is known in a truly wild state.

(I have tried to establish it both by seed sowing and planting the roots in a secluded rocky wood near Bangor, and so far the attempt has been attended with good results.)

As to whether or not the curious *Epipogium Gmelini* survives in even a single station in Britain, is not at present known; most likely not, for Mrs. Emily Wright informs me that she searched in vain for it all up the charming valley

of Tedstone Delamere, in the summer of 1881, nor could she hear of it from a companion who knew the locality well. *Orchis fusca*, *O. militaris*, *O. militaris tephrosanthos*, *O. hircina*, and the Irish *O. intacta* have suffered almost complete extermination at the hands of collectors and dealers in such, and lucky is the botanist considered who, nowadays, in a week's tramp picks up even a single specimen.

Spiranthes cestivalis still lingers in the New Forest, Hampshire, but unless in one or two other stations it is extremely rare, more so, indeed, than are the graceless, crumbling specimens in the herbariums of our botanists.

To the pleasure-seeker, plant-dealer, and botanist must not, however, be attached all the blame as to the uprooting of our rarer Orchids and other plants, for the plough of the husbandman, axe of the forester, and tools of the drainer will, likewise, have their own way in the general destruction as is actually proved in the case of *Spiranthes Romanzoviana* and *Corallorhiza innata*, as well as those in a less degree, that rare little Highland Orchid, as Darwin calls it, *Goodyera repens*. *Spiranthes Romanzoviana* is now, as before stated when treating of that species, almost, if not quite, extinct, in its only known European stations in Ireland, one of the fields in which it grew having been planted with potatoes and corn.

Up to about 1838, *Corallorhiza innata* was abundant in Ravelrig Bog, where it was discovered by E. G. Maughan, in 1807, but, sad to say, the peat bog and willow beds in which it flourished in such plenty are now things of the past. The same plant has fared no better in its Aberdeenshire station, for a most pathetic appeal was made in the *Gardeners' Chronicle* of March 31st, 1883, to save it from being killed outright by the cutting down of a wood in which it grew. An attempt was made to transfer the roots to a neighbouring spruce wood, but, although very carefully done, the writer states that success has not crowned the effort, for only two flower-stems made their appearance the following summer, and now, probably, the roots are gone altogether.

At the same time advice, as regards transferring the roots, was asked from any person interested in these plants, for in all probability, the writer remarked, more roots may be found in the original station.

To this request I replied at once, giving my best advice.* Whether or not the experiment was attended with good results I cannot say, for, as no address was given, communication with the person was cut off; but I was agreeably surprised one evening, about the same time, to receive by post a tin box containing a square of peat with the *Corallorhiza* roots intact, just as lifted in their Aberdeenshire habitat; and should these lines ever meet the eye of the donor, I beg most sincerely to tender him my warmest thanks for the present.

Everything that could be was done to establish the roots, but, sorry am I to say, that my most sanguine hopes of success were totally thwarted, for not a plant ever appeared. If all those transplanted by the writer of the appeal behaved in a similar manner, we may now naturally conclude that the Aberdeenshire station, for I am not aware that there is more than one, of this very rare and curious plant, must be expunged from our floras.

* *Gardeners' Chronicle*, April 7th, 1883.

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